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OCTOBER 1920

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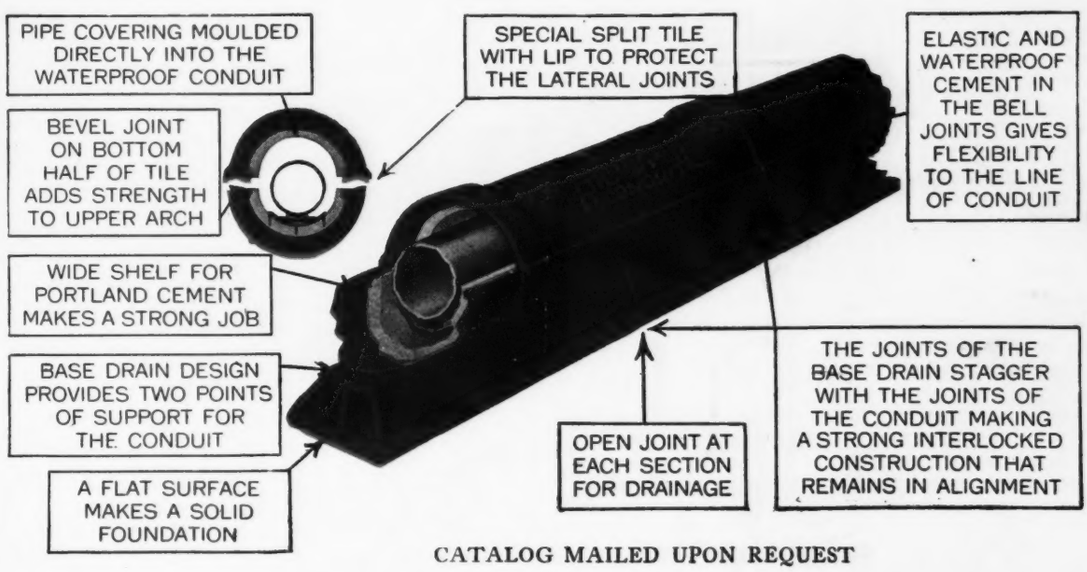
New York Office, 1123 Broadway

"RIC-WIL"

SECTIONAL VITRIFIED TILE CONDUIT

FOR INSULATING STEAM OR HOT WATER PIPES.

A COMPLETE UNDERGROUND PIPE COVERING SYSTEM.


PIPE COVERING MOULDED DIRECTLY INTO THE WATERPROOF CONDUIT
SPECIAL SPLIT TILE WITH LIP TO PROTECT THE LATERAL JOINTS
ELASTIC AND WATERPROOF CEMENT IN THE BELL JOINTS GIVES FLEXIBILITY TO THE LINE OF CONDUIT
BEVEL JOINT ON BOTTOM HALF OF TILE ADDS STRENGTH TO UPPER ARCH
WIDE SHELF FOR PORTLAND CEMENT MAKES A STRONG JOB
BASE DRAIN DESIGN PROVIDES TWO POINTS OF SUPPORT FOR THE CONDUIT
A FLAT SURFACE MAKES A SOLID FOUNDATION
OPEN JOINT AT EACH SECTION FOR DRAINAGE
THE JOINTS OF THE BASE DRAIN STAGGER WITH THE JOINTS OF THE CONDUIT MAKING A STRONG INTERLOCKED CONSTRUCTION THAT REMAINS IN ALIGNMENT

CATALOG MAILED UPON REQUEST

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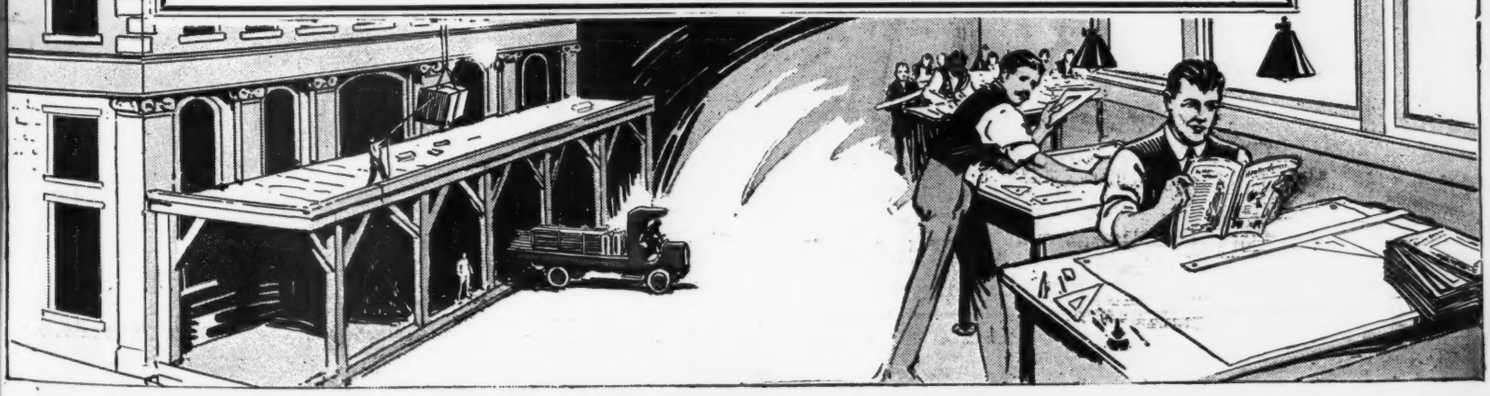

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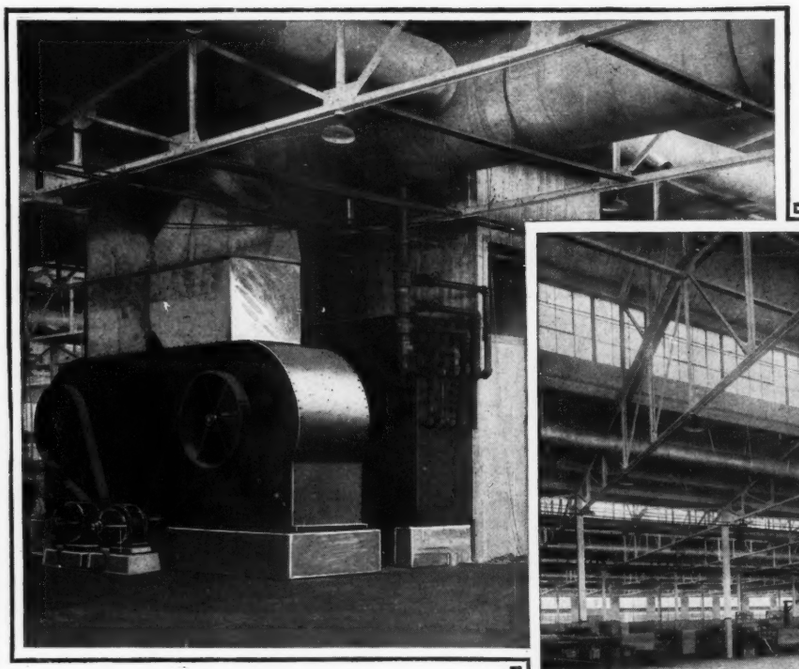

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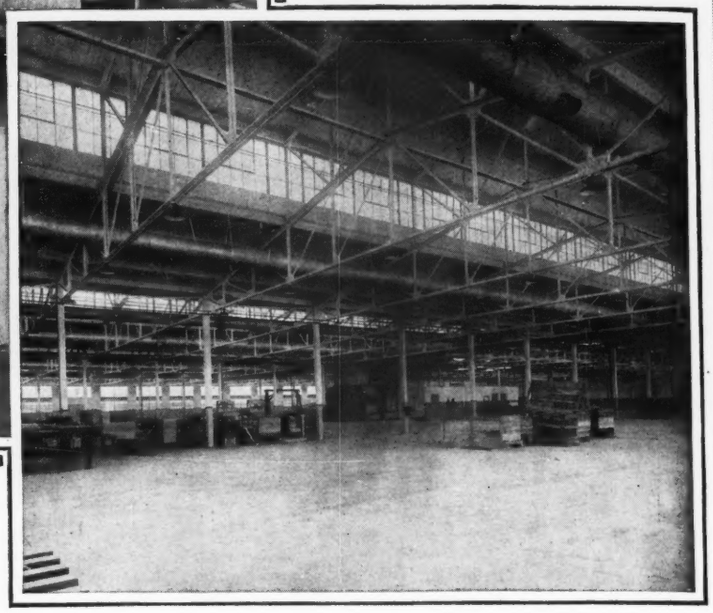

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The Heating and Ventilating Magazine

A MONTHLY JOURNAL OF ENGINEERING PROGRESS

OCTOBER, 1920

RECENT TESTS ON AUTOMATIC VENTILATORS

Results Obtained Which Indicate that Siphoning Ventilators Have an Advantage over Non-Siphoning Types

BY A. J. MACK,

Assistant Professor in Steam and Gas Engineering, Kansas State Argicultural College.

THE use of ventilators for the removal of foul gases from enclosures is quite common. They possess the advantage of providing ventilation without the use of mechanical power.

The requirements of a successful automatic ventilator are three-fold. It should be built strong enough to weather the rather exceptional conditions to which it is exposed. It should provide a reliable means for preventing rain and snow from entering the building. It should be constructed so that the foul gases may readily pass out when no wind is blowing and should not be affected by down drafts when winds prevail.

PRINCIPLE OF SIPHON VENTILATORS.

In order to meet these requirements ventilators which are of the siphoning type have been constructed. Their principle of operation is based upon the breaking up of the wind currents and directing them in such a manner as to create a decreased pressure in the upper portion of the ventilator. Ventilation is thus secured by the ejector action. When no wind is blowing the ventilation is that due to the natural circulation of the air. When the wind is blowing the siphoning action is established and additional ventilation results. The stronger the wind, the greater is the exhausting power of the ventilator.

DESCRIPTION OF TESTS.

A series of tests was conducted by the Engineering Experiment Station of the Kansas State Agricultural College upon different types of ventilators. The object of these tests was to determine the effectiveness of different types when operated under varying conditions. Data were also desired to determine what advantage, if any, the so-called siphon ventilator possessed over those types not intended to produce any siphoning action.

Three 10-in. ventilators were used in this investigation. Ventilators Nos. 1 and 3 are illustrated in Fig. 1. Ventilators Nos. 1 and 2 were of the siphoning type, but differed slightly in general construction. Ventilator No. 3 was not intended to produce any siphoning action.

WIND TUNNEL INCLUDED IN TEST EQUIPMENT.

In order to conduct the tests and to approximate actual wind conditions as nearly as possible a wind tunnel 26 in. square and 15 ft. long was constructed. In one end of the tunnel a variable speed fan was placed which was capable of producing wind velocities up to 10 miles per hour. About 3½ ft. from the other end of the tunnel a 10-in. pipe, which protruded about 2 in. above the tunnel floor was inserted to receive the ventilator. This tunnel is illustrated in Fig. 2.

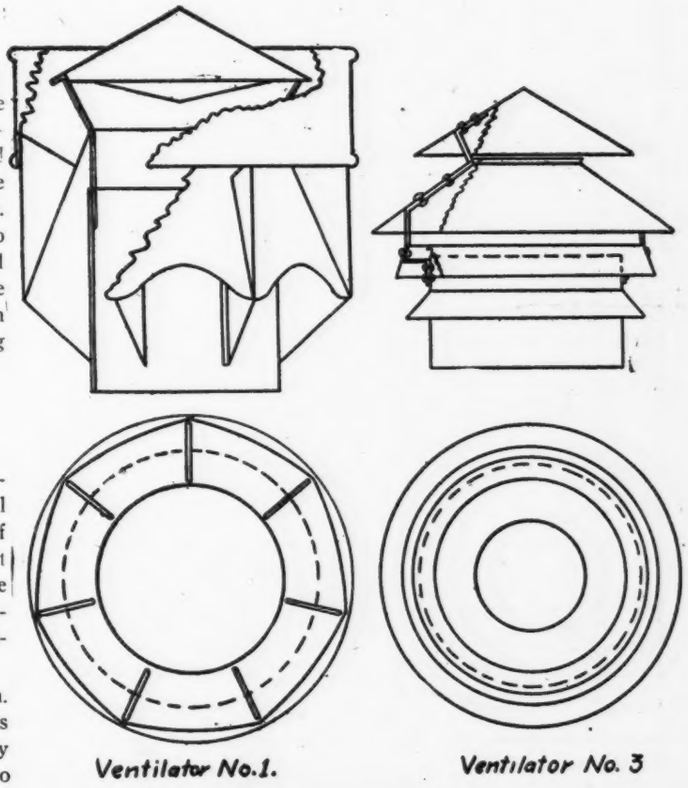

FIG. 1—TYPES OF VENTILATORS USED IN TESTS.

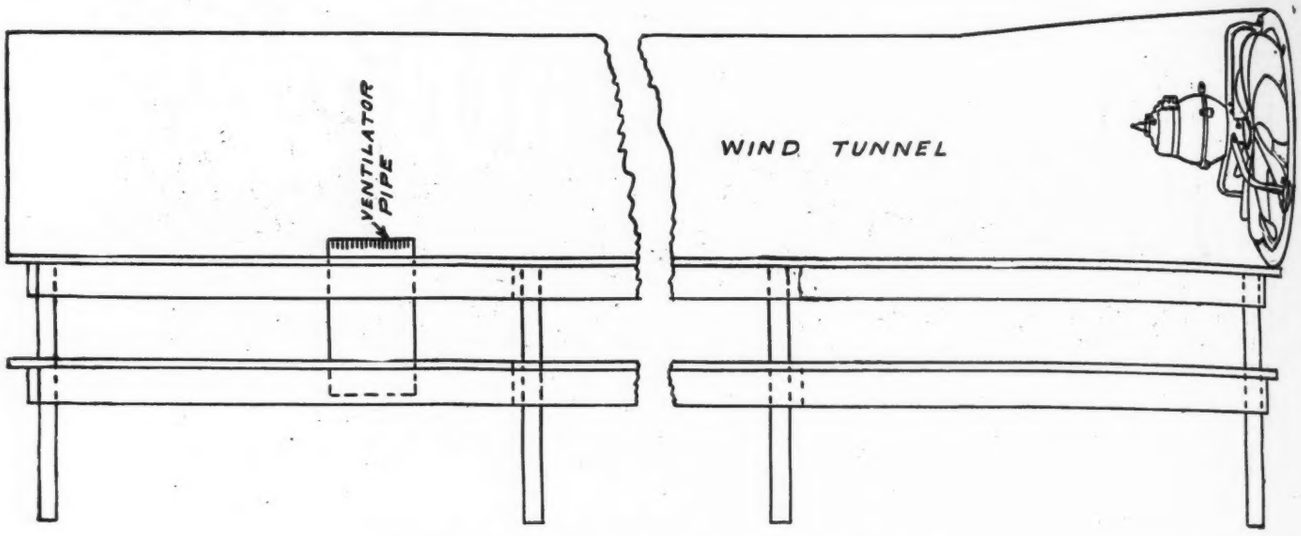

FIG. 2—WIND TUNNEL USED IN VENTILATOR TESTS.

For performing the tests a ventilator was placed over the pipe in the tunnel. The speed of the fan was regulated to produce the desired wind velocity. The velocity of the wind in the tunnel and of the air in the ventilator pipe was taken by means of an anemometer.

During the tests it was discovered that a current of air was induced through the opening provided in the wind tunnel for receiving the ventilator, even though there was no ventilator present; this velocity was measured and recorded as "No Ventilator," and will be designated as such in this article. The results of these tests are graphically illustrated in Fig. 3.

RESULTS OF TESTS ON VENTILATORS.

Velocity of Air in Miles per Hour	Velocity of Air in Ventilators in Feet per Minute			
	"No. Ventilator"	Ventilator No. 1	Ventilator No. 2	Ventilator No. 3
1	26	35	30	17
2	55	70	61	36
3	85	106	93	55
4	112	143	123	73
5	140	178	153	90
6	168	213	183	107
7	197	250	213	126

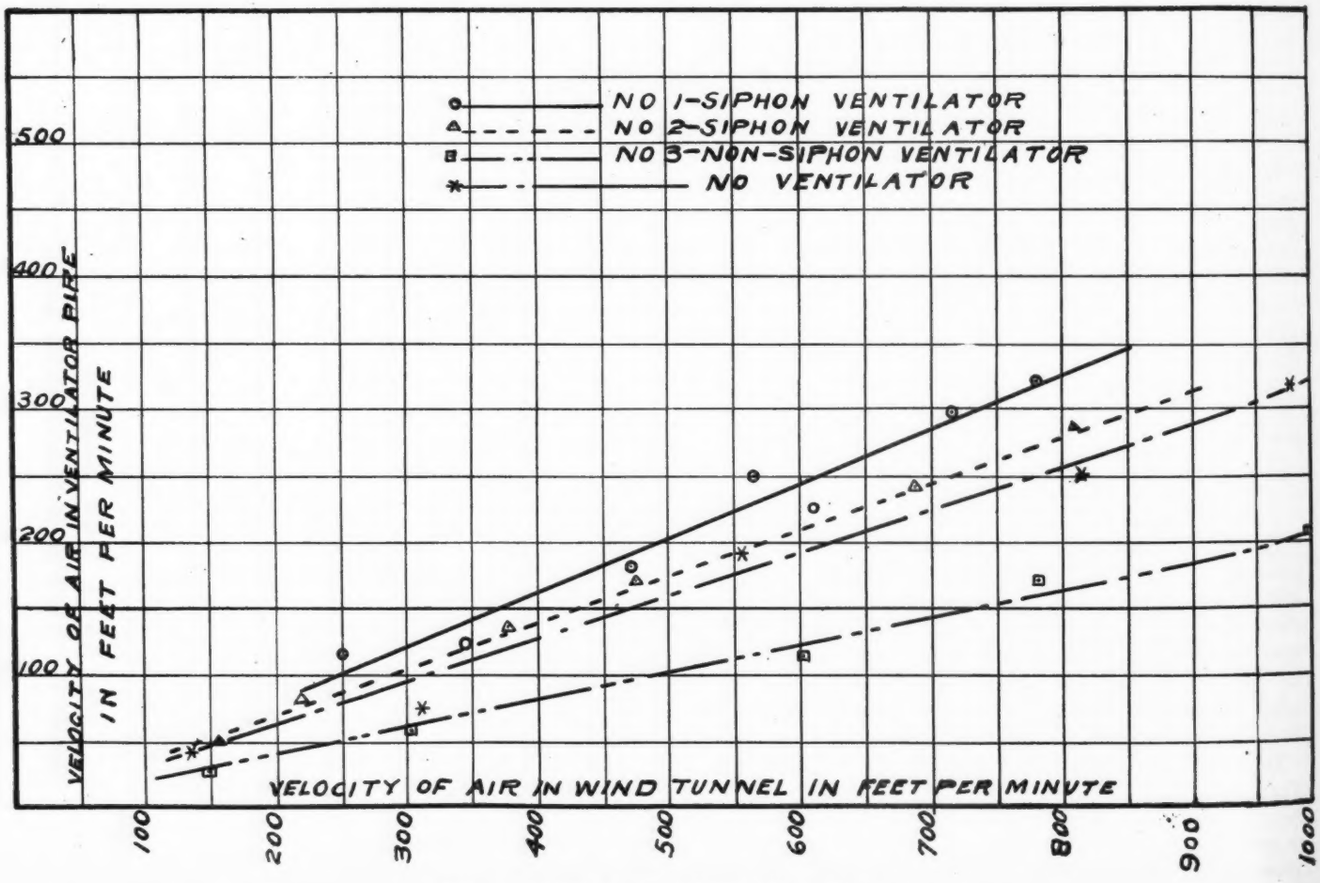

FIG. 3—RESULTS OF VENTILATOR TESTS.

8	224	286	244	144
9	252	319	274	162
10	280	355	305	179

These results indicate that the siphon ventilators have an advantage over those of the non-siphoning type. They appear to have also a slight advantage over an open pipe. Ventilator No. 3, when compared with that of an open pipe, is more of a hindrance than an aid in ventilation and is useful only in keeping snow, rain and sunlight out of the room.

It was also discovered that the effectiveness of the siphoning ventilators was influenced by the position of the vanes relative to the direction of the wind. This was probably due to counter currents or down drafts. The effect of the wind direction was more pronounced in ventilators with an even number of vanes.

Changing the position of ventilator No. 1, produced very little change in the siphonage, but changing the position of No. 2, which was constructed of four vanes, produced considerable change in velocities through the ventilator pipe. The ventilator appeared to be much more efficient when the vanes were placed at an angle with the path of the wind. This would indicate that a ventilator should always have an odd, rather than an even, number of vanes. This will always result in the vanes being at an angle with the direction of the wind and would result in better and more uniform ventilation.

ARRANGEMENT OF CONNECTIONS FOR EXPANSION TANKS OF WATER HEATING SYSTEMS

The general arrangement of connections for the closed expansion tank of a forced water circulating heating system is very important and varies somewhat in accordance with the location of the tank, the horizontal type being located at the highest point of the system, either in the plant or tallest building of a connected group, whereas the vertical or pneumatic type is placed in the engine or boiler room, with connections as shown in Fig. 1. In the latter case, either compressed air or an electric or locomotive-type air pump is used in order to maintain the necessary pressure in the tank to keep the circulating water up to the top of the system. The closed tank must be used where water temperatures above 212° F. are to be maintained.

With either type of tank, the expansion line (usually of 2-in. size) should be connected to the return header near the suction of the pumps where the pressure is the least. If made at some other point, the higher pressure necessary to overcome the pipe friction of the system would flood the tank and force the circulating water out through the relief valve and overflow of the tank, while the system would fill with air. By connecting as shown and with makeup water automatically admitted through a float-controlled inlet valve, the system is maintained full of water and the air is ejected through automatic air valves located at high points of the system. The pressure of the water and air supplied must be from 3 to 5 lbs. above the static head on the system. A waste pipe should be connected to the 2-in. relief valve.

WHY ADDITIONAL EXPANSION TANK CAPACITY IS REQUIRED.

An expansion tank should be of sufficient capacity to provide for the change in total volume (2% to 5%) of the water in the system due to changes in its temperatures. One square foot of cast-iron direct or indirect radiation contains 0.1875 gal. or 1½ pints. The capacity for wrought-iron radiation will, of course be determined by the size of pipe used in the construction of the pipe coils, one square foot of radiation in 1-in. pipe containing 1 pint. An allowance of 100% of the total radiation is usually made for the water in mains and risers of the buildings but the volume of water in the distributing system must be calculated from the lineal feet of each pipe size so used. The tank should be made double the size required for the computed volume in order to allow for the air in the tank.

The usual temperature rise allowed in water heating systems is from 60° to 220° F., or an increase of 3.8% of all the water in the system. In installations of small capacity, an allowance of 5% is necessary. In computing the required capacity, an allowance should be made for the cold water level to show in the gauge glass at a height 6 in. above the tank, as shown in the illustration. A ¾-in. test pipe should be connected from the highest point in the system to a visible outlet near the expansion tank.

CONNECTIONS FOR HORIZONTAL EXPANSION TANKS.

Fig. 2 shows the connections for a horizontal expansion tank and the usual accessories consisting of manhole, pressure and protected water gauges and a check valve for admission of air when the water contracts in volume.

The connections for the open expansion tank of an ordinary water heating system (circulating by gravity) are more simple and may be made as shown in Fig. 3. One or more tanks may be used and connected by an equalizing pipe with vent to atmosphere and overflow to nearest rain-water conductor. It is best, however, to extend the overflow to a point over a stop sink so that it may drip openly

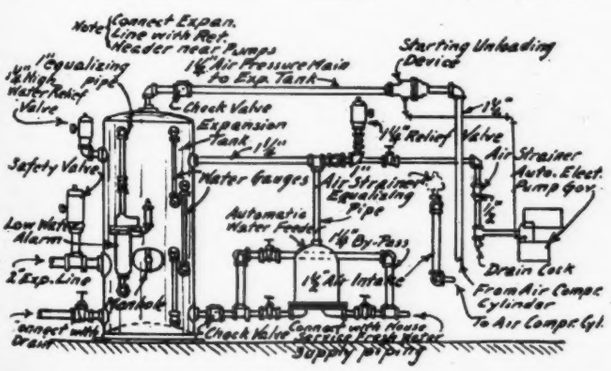

FIG. 1—PIPING CONNECTIONS FOR CLOSED EXPANSION TANKS OF FORCED WATER HEATING SYSTEMS.

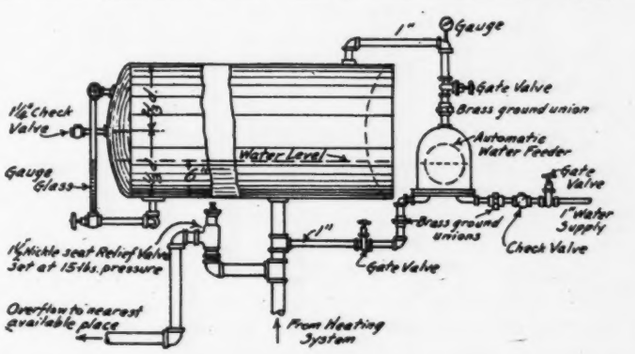

FIG. 2—TYPICAL PIPING CONNECTIONS FOR OVERHEAD CLOSED EXPANSION TANKS.

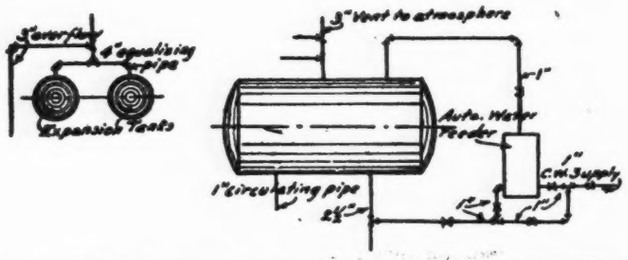

FIG. 3—TYPICAL PIPING CONNECTIONS FOR OPEN EXPANSION TANKS OF GRAVITY WATER HEATING SYSTEMS.

and disclose as excess flow into the heating system through the automatic water feeder. The last named device should be equipped with a by-pass and equalizing pipe.

The range of temperature is from 32° to 212°, causing an increase in volume of 4.33%. The size of the tank (see Table 1) is computed on this basis, plus 20% for piping and boiler, together with a safe margin to replace water lost by evaporation or otherwise and to prevent entrance of air into the system. Expansion tanks are filled one-third full and do not require more than one or two gallons of water per month to make up the loss by evaporation. If the tank is too small, water and its heat

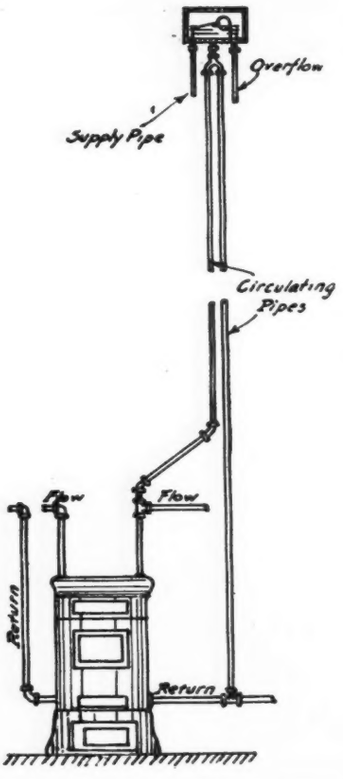

FIG. 4— EXPANSION TANK ARRANGED WITH CIRCULATING PIPES TO PREVENT FREEZING.

will be occasionally lost by expansion only to be replaced by cold water. Difficulties due to air in the system may also result from this condition.

If the hydrostatic head in a building is 37 ft., the pressure in pounds per square inch will be 15 at the boiler and the corresponding boiling point of the water, 250° F. It is practically impossible, however, for the water to rise to this temperature, for as soon as the water reaches the expansion tank, where it is vented to the atmosphere, it will boil at 212° F. Furthermore, the higher the elevation of any point within the system the lower will be the pressure and the corresponding temperature of the water at this point.

PIPE CONNECTIONS FOR SMALLER GRAVITY SYSTEMS.

Pipe connections at expansion tanks for gravity water heating systems of smaller size, such as those in dwellings, are shown in Figs. 4 to 8. These tanks may be of galvanized-iron with ½-in. by 12-in. water gauge to indicate the water level, or they may be of hardwood with copper lining, as shown in Fig. 7. The latter tank is used when city water pressure is available and is fed automatically through a float ball-cock. In this case the vent pipe and gauge glasses are omitted, but an altitude gauge must be installed at the boiler. This gauge has a red hand which is set at the water level which should be maintained and the pressure index hand, when varying from the position of the red hand, indicates the need of additional water supply. The automatic type of tank presents a neat appearance and being automatic, insures a full system at all times.

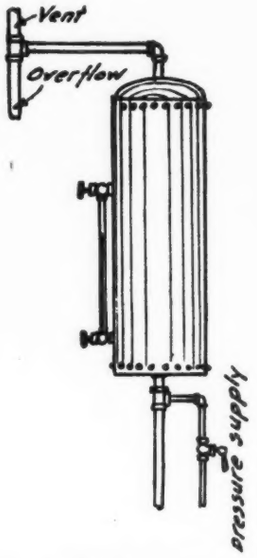

FIG. 5—PIPING CONNECTIONS FOR FILLING EXPANSION TANKS BY PRESSURE.

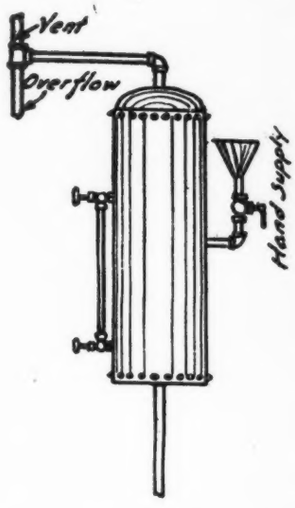

FIG. 6—PIPING CONNECTIONS FOR FILLING EXPANSION TANKS BY HAND.

All of these expansion tanks are located at the highest point of the heating system, usually near the ceiling, in a heated room or closet of the upper floor, or in the attic under the roof. In any event, an expansion tank should be installed at least 3 ft. above the highest radiator, and higher where possible, otherwise there is not sufficient static head to allow the water of expansion to return to the system quickly enough to prevent the entrance of air into the radiators. Again when an expansion tank is too small, it will overflow with the expansion of the water and when the system has cooled and contracted, the expansion pipe will expose the top radiators to the atmosphere. An expansion

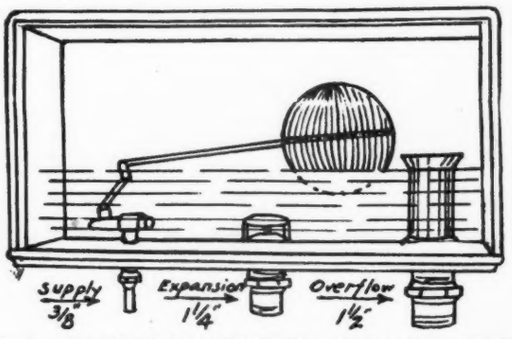

FIG. 7—EXPANSION TANK WITH AUTOMATIC SUPPLY.

tank placed in a cold unheated room should either be thoroughly insulated, together with the piping, or else pro-

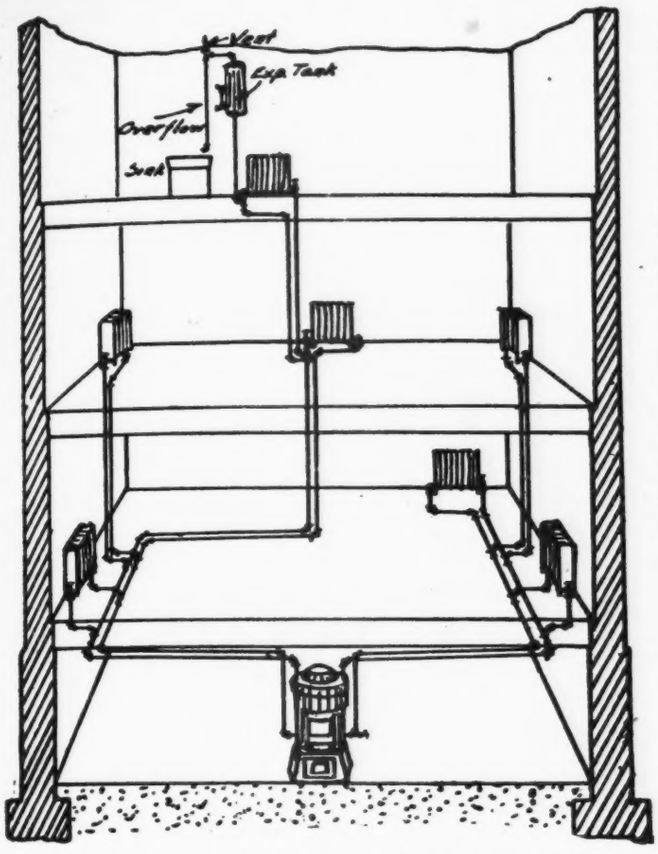

FIG. 8—METHOD OF CONNECTING EXPANSION TANKS AT HIGHEST POINT OF HEATING SYSTEM.

vided with flow and return connections as shown in Fig. 4. These connections circulate the water and prevent it from freezing.

The expansion pipe from the bottom of any of the tanks shown should be 1¼-in. in size and connected to the return of the nearest and highest radiator (Fig. 8) in small systems or preferably to the return header at the boiler (Fig. 4). It should be run in or on an inside wall and well protected from freezing. Inasmuch as this pipe is the safety valve of the system, it must not be equipped with a valve or other shut-off nor should a valve be installed in the overflow pipe. In case the mains are valved at the boiler, the expansion pipe must connect on the boiler side of the valve and where there is more than one boiler this pipe should connect to the expansion tank well above the water-line, since in draining only one of these boilers, siphonage of the water in the entire system may take place.

If the 1¼-in. overflow pipe is extended through the roof it is liable to freeze up, in particular if the tank is too small, so that it is better to run this pipe to the basement or nearest sink, with visible discharge of the water indicating any excess wastage and when the system is full. The cold water supply valve can then be closed and the altitude gage set so that its movable hand corresponds to the water-line at the middle of the gauge glass when the system is cold. A 1¼-in. vent should be connected only at the point shown, otherwise siphonage may take place. The vapor in this vent pipe is liable to freeze in severe climates so that it should be of ample size while the overflow pipe should be of sufficient size to take care of any sudden expansion of water in the system tending to fill the vent pipe.

EXPANSION TANK CAPACITIES.

(*Reprinted from Data Sheet No. 133-B*).

Size inches.	Capacity gallons.	Square feet of radiation.
10 x 20	8	250
12 x 20	10	300
12 x 30	15	500
14 x 30	20	700
16 x 30	26	950
16 x 36	32	1,300
16 x 48	42	2,000
18 x 60	66	3,000
20 x 60	82	5,000
22 x 60	100	6,000

TIME SAVING FOR THE ENGINEERING OFFICE

IN THE interest of efficiency and accuracy, many engineering offices use some kind of a form or forms for the various items which enter into their work. However, a form which appears simple when done, may have taken considerable time and thought in its working out and for this reason many offices find no time in which to develop such standards, however desirable they may be. The forms, as shown, are selected from among those used in practice in at least one engineering office. The advantage to be derived from their use will be apparent to the reader who is familiar with their application.

First among these, doubtless in usefulness, is that for taking anemometer readings in air supply or exhaust flues and their room openings. When the ventilating system is complete, traversed readings of such openings are taken by anemometer, and the average of these is compared with that required, as previously noted on the sheets. If the readings do not meet the requirements, certain adjustments are made to the dampers and diffusers in the ventilating ducts, and further readings are then taken. This process is continued until the delivery and exhaust are satisfactory throughout.

In the calculation and arrangement of the required Vento radiation, the form entitled "Vento Heaters" will be found of considerable use and a further help as a record of such calculations. Likewise, the form entitled "Fans and Motors"

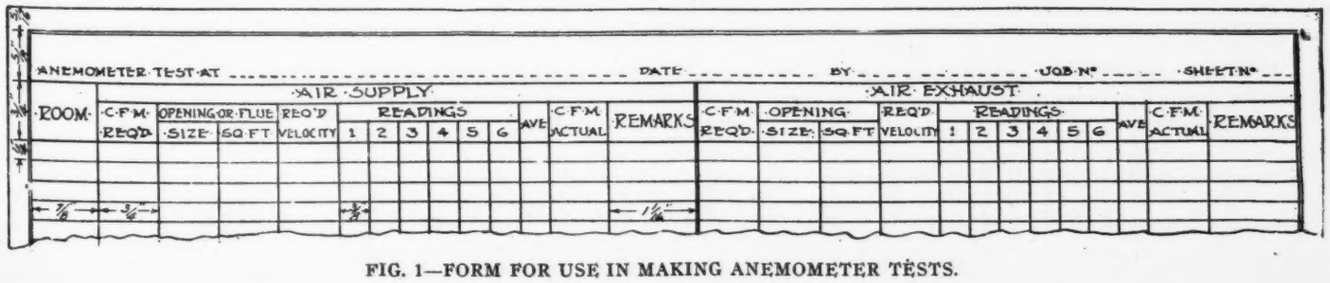

FIG. 1—FORM FOR USE IN MAKING ANEMOMETER TESTS.

VENTO HEATERS

BUILDING ..... AT ..... JOB NO. .....
Calculations by ..... Date ..... Checked by ..... Date .....
APP NO. ..... System. ..... C.F.M. ..... +10% = ...
TEMPERATURES: Outside ..... Entering Room ..... °Loss in A.W. ..... °Loss in Ducts ..... Total Range .....
HEATING SYSTEM: STEAM; Gravity, Vapor, Vacuum HOT WATER; Closed, Open, Forced
Velocity ..... F.P.M. ..... TEMPERING HEATER Outside Temp. ..... °

Row	Tier	Sections: Kind	Sections: Height	Sections: Spacing	No. of Stacks Wide	No. of Sections: per Stack	No. of Sections: Total	Heat. Surf. ☐: per Stack	Heat. Surf. ☐: Total	Free Area ☐: per Stack	Free Area ☐: Total	Connections: St.	Connections: Ret.	Remarks
1	Upper													
	Lower													
2	Upper													
	Lower													
GRAND TOTAL														Leaving Temp. ..... °

Air Washer ..... Filter ..... Loss in Air Washer °
Velocity ..... F.P.M. ..... PREHEATER Entering Temp. ..... °

Row	Tier	Sections: Kind	Sections: Height	Sections: Spacing	No. of Stacks Wide	No. of Sections: per Stack	No. of Sections: Total	Heat. Surf. ☐: per Stack	Heat. Surf. ☐: Total	Free Area ☐: per Stack	Free Area ☐: Total	Connections: St.	Connections: Ret.	Remarks
1	Upper													
	Lower													
GRAND TOTAL														Leaving Temp. ..... °

Velocity ..... F.P.M. ..... REHEATER Entering Temp. ..... °

Row	Tier	Sections: Kind	Sections: Height	Sections: Spacing	No. of Stacks Wide	No. of Sections: per Stack	No. of Sections: Total	Heat. Surf. ☐: per Stack	Heat. Surf. ☐: Total	Free Area ☐: per Stack	Free Area ☐: Total	Connections: St.	Connections: Ret.	Remarks
1	Upper													
	Lower													
2	Upper													
	Lower													
3	Upper													
	Lower													
4	Upper													
	Lower													
5	Upper													
	Lower													
6	Upper													
	Lower													
GRAND TOTAL														Final Temp. ..... °

$$\frac{\text{TOTAL C.F.M.} \times 60 \times \text{Range}}{50} = \text{B.T.U.} \div 250 = \text{☐ Equiv. Direct Rad.}$$

REMARKS OR SKETCH

FIG. 2—FORM TO BE USED IN THE CALCULATION AND ARRANGEMENT OF REQUIRED VENTO RADIATION.

FANS AND MOTORS

BUILDING ..... AT ..... JOB NO. .....
Calculations by ..... Date ..... Checked by ..... Date .....
APP. NO. ..... System ..... C.F.M. ..... Static Press .....

FAN	MOTOR
TYPE, Multiblade, Steel Pl., Disc, Cone, Propeller	H.P. Constant, Variable Speed
INLET, Single, Double	CURRENT, Direct, Alternating, Voltage .....
OUTLET, Single, Double	PHASE, Single, Two, Three, Cycles .....
WIDTH, Single, Double, Special	R.P.M., Normal ..... Max. ..... Min. .....
DISCHARGE, Top, Bottom, Vertical, Horiz., Oblique	" Incr. by Field .... % to ..... R.P.M.
HOUSING, Full, 7/8, 3/4	" Decr. by Armature ..... % to ..... R.P.M.
BEARINGS, Supported on Housing, Outboard, Special	CONTROL, Compensator, Switch, C.H. Bulletin No. .....
DRIVE, Belted, Chain, Direct Connected	
BELT WIDTH, " Single, Double, Special	
COUPLING	

NOTE: Strike out words not applying to requirements and fill out information not given.

COMPARISON OF FANS SELECTED

MAKE	TYPE	Size	R.P.M.		H.P.		WHEEL		TIP SPEED F.P.M.	AREA ☐		OUTLET VEL. F.P.M.	OVERALL DIM.		
			Max.	Min.	Brake	Motor	Dia.	Width		Inlet	Outlet		High	Wide	Long

TIP SPEED not to exceed ..... F.P.M. OUTLET VEL. not to exceed ..... F.P.M.

REMARKS OR SKETCH

FIG. 3—FORM FOR FANS AND MOTORS.

will be found to cover the situation thoroughly, with an additional aid in the comparison of fans selected by means of the record noting the characteristics of each.

KEEPING COSTS FOR ENGINEERING SERVICES.

Costs for engineering services should be known, not alone for the entire job, but for the divisions thereof, such as heating, electric, plumbing, vacuum cleaning, elevators, sprinklers and refrigeration. It will be noted that on the "Time Card," each job is divided, for hourly time account, into the first three of these divisions and this for each day of the week, any divisions not needed being scratched and the proper account substituted.

The accounting for engineering services is usually chargeable to drafting, specifications and inspection, but may be for any of these without the others. Accordingly, such itemized costs are desirable and may easily be noted opposite each division by using the proper letter. The letter "T" may also be employed for time spent on tracing but this is done more as a means of knowing whether the proper results are being attained within the office. Similarly, the time card is an incentive to honest endeavor, since the individual in charge of each job will strive to reduce the time costs and make a creditable showing.

The first form referred to is 10½ in. x 16¼ in. overall with 34 horizontal spacings at ¼ in., while the second and third forms are each 8 ½in. x 11 in.

CO. NEW YORK. TIME CARD.

		SAT.	SUN.	MON.	TUES.	WED.	THURS.	FRI.	TOTAL HRS.	RATE	AMOUNT	T	D	S	I
OFFICE WORK															
JOB NO. 852	HEAT.	4		2	4	4	3	8	30				2	6	4
	ELEC.			2	4	4	1		10				2		8
	PLUMB.			4					4				4		
"	HEAT.														
	ELEC.														
	PLUMB.														
"	HEAT.														
	ELEC.														
	PLUMB.														
"	HEAT.														
	ELEC.														
	PLUMB.														
"	HEAT.														
	ELEC.														
	PLUMB.														
"	HEAT.														
	ELEC.														
	PLUMB.														
"	HEAT.														
	ELEC.														
	PLUMB.														
TOTAL HOURS		4		8	8	8	8	8	44				32	6	8

T=TIME SPENT ON TRACING- D=FOR DRAFTING & ENGINEERING- S=FOR SPECIFICATIONS- I=FOR INSPECTION

WEEK ENDING ..... APP BY ..... NAME .....

FIG. 4—TYPICAL TIME CARD FOR ENGINEERING WORK.

THE ADVANCE OF GAS FUEL IN THE HEATING INDUSTRY

II.

The Efficiency of Gas-Fired Heating Boilers

BY DAVID H. CUYLER.

AN OCCASIONAL shift in the point of view of things is sometimes essential, even in the technical realm of the heating enginer. And again, no matter how firm a foundation we think we have builded upon, a remodeling of the thought super-structure as thought applies to fundamental facts is necessary and sometimes of great value.

While in the past most of us have honestly sought to determine through hard-bought experience and otherwise, the standards of efficiency of the various makes of commercial coal-burning boilers, it will not be denied that we have generally had to select from a few makes that are of a design as close to our ideals as we could find. We well know that few if any of these commercially-catalogued boilers really check up to as high a degree of efficiency as we would like to have them, and yet for reasons beyond our control we have been forced into the practice of adding 50% or 100% to the normal requirement and then choosing a boiler from that rating. All of this has meant more grate surface, and perforce, more fuel burned.

DIFFERENCE IN SELECTING COAL-FIRED AND GAS-FIRED BOILERS.

Herein we have the prime difference in our past point of view and that to be assumed by the heating engineer where he will be called upon to consider the use of gas as a fuel for heating purposes. It will not do to add varying percentages of gas-fuel capacity to the unit equipment, for we are dealing with a fuel where the very last word in efficiency is the fundamental requirement, and the commercial ratings as given out by manufacturers of gas-fired heating equipment will have to be known as exact in practice, or the engineer will soon be stranded on the hard and sharp rocks of sad experiences.

And so we who have grown used to the old worn ruts of "ratio of heating surface to grate surface," and "pounds of coal burned per square foot of grate," will have to learn of "something else again" even while we still cling to the old lore. This is so, simply because the signs all point to a gradual and healthy growth of the gas heating industry and the heating and ventilating engineer will be sure to find an ever increasing need for knowledge on the subject.

No, it will not suffice that you are fully equipped with all required knowledge to figure out the ultimate efficiency of any type of heat generator of the old standards, for although these standards are similar in some details; they do lack some essential points that are required where gas fuel is concerned.

HEAT UNIT VALUE OF GAS THE CONTROLLING FACTOR.

Analysis has been a handy co-worker of ours in the past, and it has been more or less easy for us to obtain reliable constituent data of the hard fuels we have been used to depend upon. Engine and boiler-room chemistry has been an open book and we have had but to select that fuel that proved up best in the essential contents. But not so with gas-fuels, for here we find that we are wholly dependent upon the heat-unit value of the local source of supply. And unlike the hard coal producer who generally will pride himself on a high content of essential constituents in the fuel he markets, the gas producer belongs to the public utility class where the income per unit of sale is governed by the public service commissions, and they, with others of this class, are wholly freed from that form of a competition that other industries are compelled to exist under, and so the gas producer fights, not to give you the highest B. T. U. efficiency possible, but rather to serve you with the poorest grade of product that he can get away with.

And thus we see how truly essential it is that we first of all know all about the gas-fuel we have to deal with. This information will embrace an exact knowledge of the heat unit content per cubic foot of gas, which varies in different localities from 500 to 650 B. T. U.; and the pressure of the gas at the point of consumption. And as to this matter of gas pressure; we will find a problem that is low in fixed qualities and remarkably high in the variables.

MATTER OF GAS PRESSURE ALSO IMPORTANT.

We will find little use for the old and interesting flue-gas analysis of the past, and the devotion we have been called upon to give to draft conditions will be minimized at least. With gas fuel the problem is similar to coal in so far as the transmission of heat to water is concerned, but we will be required to know to a very fine degree of certainty just how much heat we can transmit with any given boiler unit, and then it is going to be up to the engineer to design a gas burner equipment that will supply the amount of gas that will give just that amount of heat with an allowance for as little waste as safety and experience will dictate.

Thus we begin to understand what an efficiency computation for a gas-fired heating boiler is going to mean to the engineering fraternity. In simple terms, this computation will be a more positive and rational knowing of the exact ratio of difference betwen the heat in the steam produced at test; the heat content of the feed-water, also the heat that is developed by the gas-fuel combustion, and this knowledge, on which the success of any gas-fired heating appliance will be based, should be as nearly exact as science and care can make it.

TYPICAL TEST OF GAS-FIRED HEATING BOILER.

The writer has been called upon to make some very interesting tests of a small, but splendidly-designed gas-fired heating boiler lately, and perhaps the most desirable way of covering the title subject will be to present a single test case, with a mere outline of methods and results.

We employed a rather crude water-feed device, not having other means handy, but the weight of the water used was known to be correct to a small fraction of a pound. The boiler unit is a cast-iron cylinder with a series of cone-shaped extended tubes on its under surface, the boiler shell and tubes being suspended and enclosed in a three-section cast-iron casement. The upper outside surfaces of the unit were insulated during the test with 1-in. Asbesto cell blocks and a high-grade asbestos cement finish. The boiler was fully equipped with all required accessories for testing purposes.

TEST CONDITIONS.

The test conditions were as follows:

Heat of combustion of gas fuel used was 570 B. T. U. per cubic foot on the day and hour of the test.

The gas pressure was regulated to 2 oz. at the burners.

The total cubic feet of gas consumed during the run was 190.

Duration of test, one hour.

The evaporation by weight was 83½ lbs. of water per hour into steam at 10 lbs. gauge, or 25 lbs. absolute.

The temperature of the feed water was 62° F.

HOW THE TEST FIGURES WORKED OUT.

From the above we worked out our computation as follows:

The total heat in 1 lb. steam at 25 lbs. absolute is 1163 B. T. U.

The temperature of the feed-water was 62° and 62° minus 32° equals 30° as being the assumed B. T. U. content of the feed-water above 32°.

Then—

1163 minus 30 equals 1133 B. T. U. per pound, and 1133 multiplied by 83½ lbs. equals 94605 B. T. U. which was the heat absorbed by the water in the boiler unit.

As each cubic foot of gas burned contained 570 B. T. U. and as the total gas consumed was 190 cu. ft., the total heat supplied was found to be 108300 B. T. U.

The efficiency then is:

$$\frac{94605 \times 100}{108300} = 87.35\%$$

ENGINEER MUST KNOW TRUE PERFORMANCE CURVE OF EACH UNDERTAKING.

We have here a very fair example of what will be required of the heating engineer who presumes to enter this new field. We shall certainly have to rid ourselves of any vestige of dependancy upon theory or trade literature claims. We shall have to know beyond any manner of doubt the true performance curve of each and every undertaking, and if all is not right, it will be for us to demand such adjustments and changes as will be necessary to make the fuel-burning equipment bear a truly efficient relation to the heat-transmitting apparatus.

GAS AS THE COMING FUEL.

Gas is the coming fuel for modern and efficient service. It is so far beyond any other fuel that it is verily in a class by itself, but we are in the pioneer days at present, and we had best be honest in confessing that we have a long road to travel yet, but as sure as the sun sets; it is coming, and all necessary knowledge will be gleaned from the present seeds we sow, and all the by-paths and stony places will be smoothed out with the healing balm of a future when we know the truth of it all.

The writer is only too well aware that many who are reading these articles will pronounce the whole matter a wild dream or worse. All worthwhile things have been given birth with just that kind of labor pains, and we will survive. We will all of us go right along progressing with the progressive age, whether or not we feel the propulsive movement, and it may be just possible that this dream may come true after all. A curve charted showing the comparative costs of coal and gas fuel in some localities will bear a very close relation, even now.

Let us all live and let live and be willing to wait a bit and see what comes of it for we never can tell what this old world is going to spring on us next.

NEW FORM OF PSYCHROMETRIC CHART

Especially Designed for Those Who Have Not Specialized in this Field of Engineering

(*See Pages 50-51 for Hill Psychrometric Chart*)

A notable attempt to simplify the work of those called upon to deal with problems in air conditioning has been made by Dr. E. Vernon Hill, of the Chicago Department of Health, in the form of a new psychrometric chart small enough to be carried in the pocket, but without sacrificing any part of its accuracy or completeness.

In presenting this chart, the author makes the comment that the previous forms of psychrometric charts have, in general, been designed by engineers for their own use or for the use of experts in this line of work. They are, for this reason, used with difficulty by persons who have not specialized in air conditioning engineering.

Supplementing the main chart is the well-known "comfort" chart which gives the desirable wet-bulb temperature and the corresponding air motion for persons at rest, doing light work, moderate and heavy work, under both winter and summer conditions.

DIRECTIONS.

The course of procedure in using the new chart is given as follows:

Locate point "A." From this point upward to the right, along cross section lines, read the dry-bulb temperature at border (90° F.). Upward to the left, along cross section lines, will be found the dew point (32° F.). Downward along the vertical curved lines read the wet-bulb temperature (60°) on the saturation line. Read the relative humidity on the horizontal relative humidity curves or interpolate between the same. Where interpolation does not give a sufficient degree of accuracy proceed as follows:

Divide the vapor pressure at the dew point by the vapor pressure of the corresponding dry-bulb temperature. This, expressed in percentage, will be the true relative humidity. Example: See point "A." The intersection of the 60° wet-bulb curve and the 90° dry-bulb curve at point "A" gives a dew point of 32° and a vapor pressure of 0.180. The vapor pressure at 90° dry bulb is 1.408; 0.180 divided by 1.408 = 0.128, or 12.8% as the relative humidity of these conditions.

Values associated with the wet-bulb temperatures (total heat) with the dry-bulb temperatures (volume), and with the dew-point temperatures (grains of moisture) are read directly on their respective scales.

On the right margin of the chart the volume of a pound of air in cubic feet is given, both dry and saturated. To obtain the volume of one pound of air with a moisture content somewhere between absolute dryness and complete saturation, multiply the difference between the volume of a cubic foot of dry air and the volume of a cubic foot of saturated air by the relative humidity and add the result to the volume of dry air as given in the table. Example: See point "A." At 90° temperature the volume of one pound of dry air is 13.86. The volume of one pound of saturated air is 14.55, the difference is 0.69; 0.69 × 0.128 (the relative humidity at point "A") = 0.088; 0.088 + 13.86 = 13.948, the correct volume in cubic feet for one pound of air at the dry bulb temperature of 90° and the wet bulb temperature of 60°.

COMFORT CHART.

To determine the correct wet-bulb temperature for comfort note, first, the condition of the subject, whether at rest, at light work, etc.; second, observe the velocity of the air motion. This should be the actual velocity in the room at the location of the subject: Example: Assume the subject at rest and the air motion 55 feet per minute. The "at rest" curve crosses the wet-bulb temperature line for winter conditions at 58°. This is the correct wet-bulb for winter months. Owing to the fact that we wear less clothing and consume less food during the summer, the comfortable wet-bulb for the summer months is approximately 4° higher than during the heating season.

Cooling the Subway.

Fourteen years ago there was established in New York a cooling system that offers many unique features. Nothing was said about it at the time, nor has it since been described, but it has been in use every season since 1906.

About 1906 the subject of ventilating and cooling the New York subways was prominent in the minds of the Interborough company's officials, as well as the then Board of Rapid Transit of the City of New York, and the public that utilized the subway. All of the power that was delivered to the motors operating the trains was changed into heat that raised the temperature of the subway to a disagreeable degree. Especially at the Brooklyn Bridge station was the degree of heat unbearable in the summer even at that time, while of course it would have been increased with the increasing traffic. Due to the fact that the subway was surrounded by a layer of waterproofing, the heat could only get to the ground slowly and the ground would only slowly dissipate it. So great was the volume of heat delivered at the Brooklyn Bridge station, where all through trains concentrated, that the temperature in the station often rose to 110° and 115°, much to the discomfort of passengers.

The then Board of Rapid Transit employed the writer to design a plant that would relieve this condition, with the result that a final apparatus was installed that has been at work every season since. If the operation of this apparatus was stopped in warm weather the conditions would be simply intolerable.

HEAT REMOVED BY WATER.

The heat was finally removed by water. Two wells were sunk, each yielding on test 200 gal. per minute of 60° water. Only 200 gal. in all were finally employed, for it was found if 400 gal. were pumped, the head of the water at adjoining buildings on Park Row would be pulled below the head of the piles on which the buildings were built and trouble would result. This water was delivered by two centrifugal pumps (electrically operated by the same current that ran the trains) to two coils of pipe placed in two air coolers, one on each side of the station on the unused side platforms. There are about 7,000 sq. ft. of 1-in. pipe in each, or 14,000 sq. ft. in all. This pipe was placed on staggered close centers and then enclosed in a galvanized-iron box or casing.

FANS ALSO USED.

A fan was used at each of these casings, having a capacity each of about 75,000 cu. ft. of air. These fans draw the air from the body of the station and deliver it over the pipe surface, so cooling it and passing the heat into the water.

The water is then led by pipes to a small reservoir on the north platform whence it runs to the sewer.

The air, after first being driven by the fans over the cooling pipes, is lead by large galvanized-iron ducts to branch ducts that run the full length of the island platforms and is showered downward towards the platforms through openings placed about every 10 ft., giving both the effect of the cooled air combined with the fan effect of rapid motion of air.

STATION TEMPERATURE REDUCED 15 DEGREES.

The general temperature of the station is reduced from 15° to 20° and rendered tolerable.

About 200 gal., or 1,684 lbs., of water are raised from 68° to 79°, or about 24,000 B. T. U. are taken from the subway station each minute. This is equal to 122 tons of refrigerating effect per day, at a cost only of pumping the water and operating the fans.

For a while it was planned to erect similar cooling plants in each station from the Battery to 96th Street by piping water that could be obtained from the underflow at or near the vicinity of the Manhattan Bridge towers. But in the meantime, B. L. Turner, engineer of the Rapid Transit Commission, had completed his plan of ventilating chambers between each station. This relieved the tunnel of a great amount of fine iron dust that resulted from the friction of the break beams (estimated at a ton a mile per month) and also drove out some hot air and admitted some of the cooler surface air, and so relieved conditions as to stop the "kicking" of the public. But the Brooklyn Bridge station near the surface exposed such a large area of thin surface to the sun's rays that refrigeration is yet necessary, and the system has been in fourteen years' continuous summer use.

COOLING PLANT NOTICED BY FEW.

Only a few of the public who use the subway have noticed the plant, observed the fans running on either side delivering air to be cooled or the overhead system of distributing ducts. The "regulars," however, that use this station, while they may not know where the cool air comes from, habitually are found grouped under the cool moving air that pours out of the openings at intervals along the platforms, and the guards on the locals, as they stop for a while at this station, step out from the car onto the platform to enjoy a moment's whiff of cool moving air.

RECORDS OF TEMPERATURES.

The temperature of the outside air does not always give a correct idea of the benefit of the system, as the temperature of the station when the system is not in use was often much higher than the outside air. For example, records show that on July 19, 1905, when the outside air was 84.1°, the temperature of the station air was 91.1°, or 7° higher. Other records show that when the outside air was 97° or 98° the station air would run 110° and upwards when the system was not running. The cooling system kept the air down to 80.9° at all times, which means that it averages from 11° to 20° below what it would be otherwise. This was done with 200 gal. per minute less water than was calculated. Had the full amount of water been realized, the temperature would have been 6° or 7° lower, but a temperature of from 11° to 20° below what it would have been otherwise was considered a very satisfactory result.

The test record of this system shows some interesting figures on the rate of transfer in B. T. U. per square foot per hour in transferring heat from a current of air to moving water through pipes, a very vexing subject on account of the many variables in conditions.

RECORD OF TEST.

Inlet temperature of water, deg. F.	61.1°
Outlet temperature of water, deg. F.	76.78°
Range of water temperature, deg. F.	15.68°
Air inlet temperature, deg. F.	84.02°
Air outlet temperature, deg. F.	75.25°
Air temperature after diffusion on platform, deg. F.	82.35°
True mean difference calculated by Hansbrand method deg. F.	10.24°
Amount of water per minute, pounds	1683.8
B. T. U. per minute	26402
B. T. U. per hour	1584120

Surface, square feet	14200
Transfer per hour per square foot per degree of difference, deg. F	10.8
Tons per day in terms of ice melting	132

Other tests showed a rate of transfer of from 9.4 to 11.3 B. T. U. and a tonnage from 112 to 136.

The relative humidity of air on platform ranged from 64% to 68% and the heat balance, considering condensation, figured nearly correct.

It must be remembered that when such a system is not in operation the air in the subway station is often above the outside air and the station might be intolerably hot when the outside air was comfortably cool. It was suggested by the writer that an opening from the street to the suction of the fans might be made to take advantage of this condition whenever it occurred, but in view of the fact that the present method allowed a reasonable temperature at all times this refinement was not thought necessary.

The entire plant was put in by the Starr Engineering Company from designs by John E. Starr, loyally backed by Geo. S. Rice, chief, and B. L. Turner, assistant engineer of the Rapid Transit Commission.—*John E. Starr in Refrigerating World.*

Fuel Conservation on a National Scale.

In an exhaustive discussion of fuel conservation, David Moffat Myers, speaking before the American Boiler Manufacturers' Association, in French Lick Springs, Ind., recently, presented the following plan for adoption on a national scale:

1. Regulation of quality of coal shipped from the mines. A bill is already before Congress for such a measure. It would avoid compulsion in even the slightest degree. It would depend upon the analyses of standard coals which could be supplied from the various mines.

2. I would anticipate measures for the prevention of flagrant waste of all fuels, and these measures should apply to waste in all states of the fuel, from its production and preparation to its transportation and final consumption.

3. It might be here suggested that zoning of coal is productive of a large economy in transportation. Therefore, zoning to a reasonable extent may well become one of these future measures.

4. Better means of coal storage; urgently needed in order to flatten out the load curve at the mines. Owing to the seasonal demand for coal, the mines of the country are over-manned, over-capitalized and over-equipped 40%. The coal industry is the worst run of all basic industries in the country, and its influence is so far reacting in all of our industrial and social problems, that we must look for corrections of this most flagrant of its faults.

Universal coal storage, both at the mines, but perhaps more especially at points of consumption, and by the railroads, would more than any other one single measure assist in the general solution of this problem.

5. We must look forward to a closer co-operation in the matter of coal consumption, between the consuming public and the United States Bureau of Mines. This bureau has been working on a general educational program for the conservation of fuel in many lines of research and investigation. There is no conservation possible which has not been considered by the bureau. It is interesting itself intimately in prosecuting this work, but its efforts should be expanded and intensified.

6. As a part of the plan which I have in mind, very great advantages would arise out of the appointment by the Bureau of Mines of a resident engineer for each State in the union. He would report to the Department of the Interior on all matters relating to any phase of the fuel problem, brought to his attention in his territory. He would confer with manufacturers' associations and business men in regard to their problems and assist in their solution. Behind him would be the great resources of information and experimental laboratories of this government bureau. This resident, or State conservation engineer, would thus bring about the closest possible touch between the local industries and the clearing house of information at Washington.

7. In connection with this plan, which should cover all branches of fuel conservation, there should exist a body of citizens advisory to the United States Bureau of Mines in the planning and development of the conservation program. In such an advisory committee, there should be representative men of business, engineers and citizens from various parts of the country representing widely the general interests.

8. Such a program should interest itself in the correct design of new power plants, and in supervising changes of power equipment in existing power plants, which do not at the present time always lead to better economy, but should in the future be made to do so. Some control over this matter of plant design should be provided for. It is obviously unfair to the public in general to allow plant changes or new plants to be installed which will permanently waste fuel. Such control would not mean added expense to the owner of the plant, but would, on the other hand, frequently reduce the initial cost of investment, and would always reduce the cost of operation. The measure would lead to raising the standard of power plant design as well as of power plant operation. The Bureau of Mines possesses facilities for testing power plant apparatus of all descriptions, and is thus able to inform itself and the public as to what is worthy or unworthy in modern practice.

9. The government should provide for the encouragement of new inventions and new developments leading to economical use of fuel for power generation and for other purposes.

10. Such a future program should include a broader and more intensified plan of education than ever before applied. In every technical school there should be inaugurated lecture courses on fuel conservation. Educational courses suited to their requirements, should be spread throughout the country, to include the teaching of the engineers and firemen who run our plants. Our steam plants are under the immediate management of chief operating engineers. The examination requirements for licenses in this profession call for practically no knowledge of steam and fuel economies. These examinations deal chiefly with matters of safety, repair and maintenance of equipment and neglect almost entirely the subject of fuel economy. This is directly responsible for a large preventable waste of fuel.

Before concluding his address, Mr. Myers referred with feeling to the importance of the "human factor" and declared that "all our great industrial and social problems of to-day are due to our lack of attention to the human factor, the miner behind the shovel and the man behind the machine."

Soft Coal Figures Given Out by Geographical Survey.

According to a report issued by the Geological Survey, huge industrial and utility plants have been going on during the last few months with an average of from only one to two weeks' supply of coal. While in ordinary times there is a supply of some 35,000,000 tons of coal on hand throughout the country in the early spring, the country's surplus throughout last spring was reduced to a nominal amount. Inability of coal operators to get anywhere near an adequate supply of cars to take coal from the mines is brought out by the Geological Survey.

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NO ONE, of course, regrets errors in an engineering journal more keenly than the publishers themselves. For that reason, the greatest care is taken to insure the accurate presentation of all matter, especially mathematical discussions and the like. In spite of this care, errors will creep into the text of the most carefully-edited journals often in a manner that suggests the ingenuity of the Evil One himself. Many a good story of such occurrences is on tap in every publication office and it needs only a knowledge of the technical details involved to appreciate the uncanny combination of circumstances that are often responsible for these "breaks."

It is easy to ignore such errors in the hope that, if noticed, they will soon be forgotten. It is obvious, however, that the more courageous way to do, and the way caluclated to be of the most benefit to the reader, is to "acknowledge the corn" and give equal publicity to the correction. This holds true whether the error is typographical or is one in "author's" copy.

Readers, therefore, especially of engineering journals, confer a distinct favor on the publishers when they point out errors of any importance in the reading columns. Their correction, so far from being a sign of weakness, is in the interest of engineering accuracy, and that interest must be the controlling factor.

THE merger of the *Metal Worker* with *Sheet Metal,* which has just been announced, marks a turning point in the trade journal field which brings up interesting reminiscences. So long and so closely has the *Metal Worker* been identified with the sheet metal and stove and furnace trade that its career might be said to reflect that of the industry itself. Established long before heating engineering attained its present status, the *Metal Worker* for a long time covered that field as well and made many important contributions to the art.

The old-timers will recall also the place given to heating and ventilation in *Engineering Record,* under Meyer, and how this branch was later taken up by *Heating and Ventilation,* which afterwards became the *Engineering Review.*

At the time THE HEATING AND VENTILATING MAGAZINE entered the field, in 1904, the *Engineering Review* was in the full flush of its career and, we believe, would still have maintained its prestige if it had caught the significance of the growth of heating and ventilation as one of the engineering arts which was becoming necessarily more and more divorced from plumbing and sheet metal work. The load of all three industries, which it was attempting to carry, proved a formidable burden, so that the merger of *Engineering Review* with the *Metal Worker* in 1912 was generally considered, as proved later to be the case, to mean its retirement from the field. Meanwhile the advance of heating and ventilation was accompanied by a corresponding growth of THE HEATING AND VENTILATING MAGAZINE until it came to enjoy a patronage and prestige that easily distinguished it in its field.

With always a kind place in our heart for the *Metal Worker,* it was with a feeling of real regret that the identity of this journal seemed about to be swallowed up in the new merger. That it will be continued as *Sheet Metal Worker* and that its heating and plumbing sections will appear as the *Plumber and Steamfitter* is, however, assurance that the personality of the *Metal Worker* will not be lost, especially as its editorial direction will continue in the hands of its veteran editor, Frank K. Chew.

We wish the new management, headed by Edwin A. Scott, every success, and look forward to see both journals become strong and useful factors in their respective fields.

THOSE interested in good chimney construction will welcome the efforts of the National Board of Fire Underwriters, which have been crowned with success, in drafting a model chimney ordinance which has met with the approval of the American Society of Heating and Ventilating Engineers, the National Warm Air Heating and Ventilating Association, the Boiler and Radiator Manufacturers' Association, and other bodies. The ordinance as originally drawn and published, has been modified to meet the suggestions of these organizations. In its amended form it will be offered for adoption as standard practice. As soon as the revisions are completed the text of the ordinance will be presented in these columns.

WRINKLES

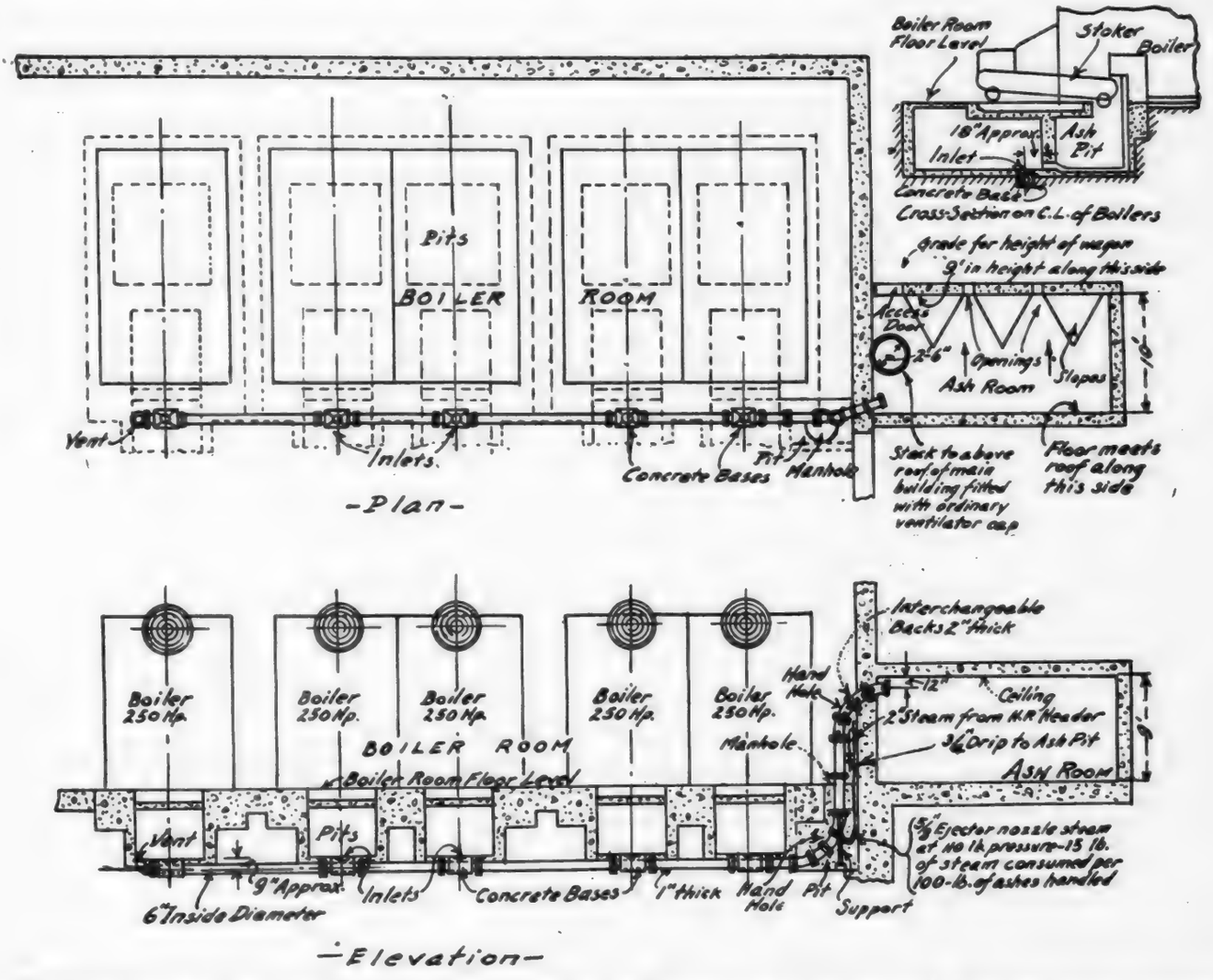
A Vacuum System of Ash Removal.

If coal handling is a problem, then ash removal is a greater one, since coal may often be run by gravity through an open chute into the basement of a plant, whereas ashes must be elevated. Aside from the cost of handling the ashes, the low first cost of installation and maintenance has made the vacuuum method of ash removal quite attractive, especially in small plants where the expense of elaborate conveyor systems would not be justified.

The vacuum method is also well adapted to many other cases which frequently arise in connection with existing plants which are already equipped with mechanical conveyor systems. For instance, one plant was so designed that coal was received and ashes delivered to cars on the same trestle which, of course, tended to delay matters somewhat. This disadvantage, plus that of wear and tear on the numerous buckets and links of the conveyor system, caused a change to be made to the suction method. In the choice of any particular system it must be remembered that in plants located in the heart of a city, i is imperative that the nuisance of dirt and noise be eliminated.

The accompanying illustration shows the vacuum system of ash removal as installed in the Missouri State Capitol, Jefferson City, Mo. In operation, steam ejected into the riser pipe through a 5/8-in ejector nozzle at a pressure of 110 lbs. or less, produces a vacuum which removes the ashes as they are raked to the inlet of each ash pit. Fifteen pounds of steam at a pressure of 110 lbs. consumed per each 100 lbs. of ashes handled. Large clinkers are broken up by hand before entering the conveyor inlets and only one or two inlet covers are off at the same time, the men working fast while the system is in operation, otherwise the consumption of steam would be excessive and the cost per ton of ashes handled greatly increased. Maintenance costs are from one to one and one-half cents per ton of ashes handled.

The abrasive action of ashes at high velocity is especially severe so that the piping is made of special chilled iron of 6-in. bore and 1-in. thickness. Elbows of 22½° form the two



ARRANGEMENT OF A VACUUM SYSTEM OF ASH REMOVAL IN THE BOILER PLANT OF THE MISSOURI STATE CAPITOL, JEFFERSON CITY, MO.

bends of 4-ft. radius and with the backs of these elbows reinforced by 2-in. thickness, they will stand the effect of handling at least 4000 tons of ashes, after which the backs may be easily renewed. One elbow in each bend is fitted with a handhole placed on the inside radius. Some engineers do not favor the long radii bends but prefer the use of tees since the accumulation of ashes in the dead end receives the impact and takes up the wear.

The ash room or hopper, of which sections are shown, is 10 ft. by 20 ft. by 9 ft. in height on the discharge side, thence sloping upward to the ceiling at the other side. Still other slopes direct the ashes through openings to wagons outside. The ash pipe enters 1 ft. below the roof and is turned at slight angle to discharge against the far wall. For this reason the ventilator is placed at the other wall so as to discharge but a minimum of dust into the atmosphere. The system is also vented in the first ash pit since the roof ventilator serves only as an outlet for the steam. The latter is made 30 in. in diameter to reduce the discharge velocity and thus eliminate dust and is carried up just above the roof of the main building at which point it is fitted with an ordinary ventilating cap, no special or movable ventilators being required. A plate of iron, 4 ft. square and 1 in. thick, is placed on the inside wall to receive the impact of the ashes from the 6-in. discharge pipe.

It is of interest to note that in the Yonkers power plant of the New York Central Lines, steam at a pressure of 175 lbs. is used to effect a lift of 35 ft., which is about the maximum lift recommended.

A Maintenance or Guarantee Sign for Contract Work.

Heating and ventilating systems installed by contract and under bond should, at the completion of the work, be posted by a guarantee sign for maintenance and correction of all defects up to the date specified on the sign.

The accompanying sketch shows such a sign which, placed in a conspicuous position near the installation, serves as a reminder to the engineer that he must record his objections before the expiration of the guarantee. It also serves as a simple and inexpensive advertisement for the contractor. To insure permanency, the sign may be placed under double thickness glass (size 3 in. x 8 in.) and mounted in an oak frame, painted black. This is secured by screws to a base of solid white pine. The latter is attached to the wall by screws and painted white.

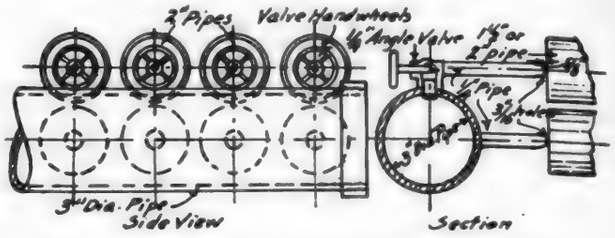
The contractor's name and address, expiration date of contract and other contract provisions as to maintenance should read somewhat as follows:

> We guarantee until *July* 1, 1921 all workmanship and material of this *heating system* as installed by us in accordance with our contract of *June* 19, 1919.
>
> *J. H. Smith & Co.*
>
> *Dated July* 1, 1920. Contractors.

An Arrangement of Gas Burners Under Boilers.

An arrangement of gas burners which has been found satisfactory for burning gas under boilers is shown in the accompanying sketch. In the instance shown, the height from the grate to the boiler shell was 4 ft. so that the burners were installed 2 ft. above the grates and above fire doors, thus being out of the way when it was desired to use coal, a change which was quite frequently made without a drop in steam pressure.

Boilers of 150 H. P., 6 ft. by 18 ft. in size, require a 3-in. supply pipe with thirty nozzles, of which twelve are equipped with ¼-in. regulating valves. A boiler of 100 H. P. would require 25 nozzles. The regulating valves are reduced

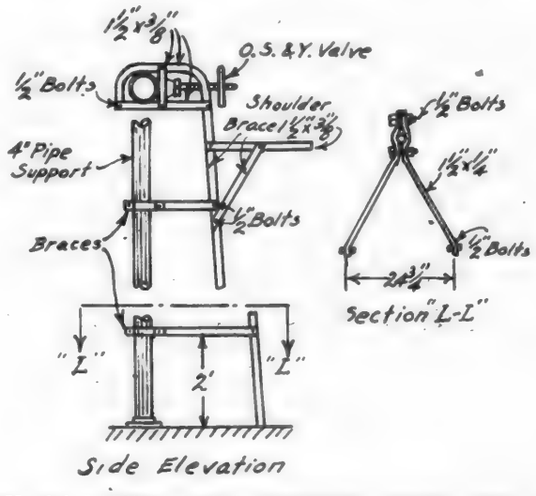


ARRANGEMENT OF GAS BURNERS UNDER BOILERS.

at their outlet to 3/16 in., a reduction that give the best mixture for a 2-in. tube and a pressure of 7 oz. The discharge end of the nozzles should terminate ⅝ in. from the 2-in. pipe openings. These 2-in. or 1½-in. pipes are built into the brick work but, where it is not necessary to change the kind of fuel and the setting is old with insufficient room above the fire doors, the pipes could be bricked in the fire doors, or doors could be cast and cored with holes tapped for screwing in the air tubes.

Providing Access to Important Valves.

Where large overhead valves, which require frequent operation and to which access is imperative in an emergency, cannot be readily controlled from the usual pipe walk ways or galleries, it is advisable to install a permanent iron ladder constructed with a shoulder brace of ample radius, as shown in the sketch. This brace is necessary where valves of large size must be quickly operated.



DETAIL OF LADDER WITH SHOULDER BRACE FOR QUICK OPERATION OF IMPORTANT VALVES.

The pipe line at the valve is supported by means of an adjustable unright pipe bolted with a flange to the floor and secured to the pipe line with a ½-in. bolt. The ladder and shoulder support should be thoroughly bolted and braced, using 1½-in. by ⅜-in. bar iron and ¾-in. by 24-in. iron rungs.

Method of Insulating and Heating Exposed Water Lines to Prevent Freezing.

Water lines in unheated rooms or buildings, particularly those for fire purposes, require a certain amount of protection from freezing depending upon the amount of water used or circulated. Fig. 1 shows how a low or preferably high-pressure steam line may be run parallel and beneath the water lines in the same insulated enclosure. The steam

main may be one existing primarily for some other purpose or for heating an isolated room in the structure, as frequently is the case in certain types of buildings.

The steam pipe should be placed far enough below the water lines to insure the best all around results, balancing the radiating effect against that of convection. However, the distance between the heating and cooling lines must be consistent with economy since any increase in this distance requires more covering, together with a loss of

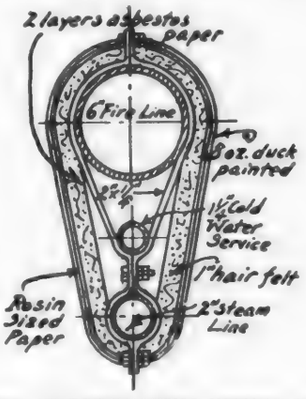


FIG. 1—METHOD OF PROTECTING WATER LINES FROM FREEZING BY MEANS OF A STEAM PIPE RUN IN THE SAME ENCLOSURE.

heat to the building from increased exposure of covering. The heat lost to the cold water service line is an advantage when used at lavatories or if the water is to be eventually heated at its point of use.

The insulating scheme shown in Fig. 1 requires two layers of asbestos paper, one layer of 1-in. hair felt and rosin-sized paper, enclosed in 8-oz. painted duck, sewed on, but if a steam line cannot be used for heating, the method shown in Fig. 2 will ordinarily be sufficient to prevent freezing. This is accomplished by first applying felt on the water pipe, lapped 1 to 2 in. and secured with single twine, wound spirally on 6-in. centres, then three layers of 1-in.

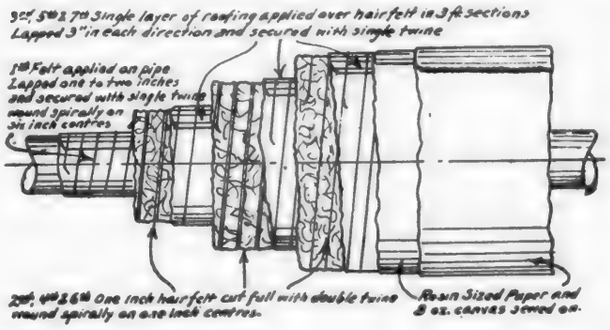

3rd, 5th & 7th Single layer of roofing applied over hair felt in 3 ft. sections Lapped 3" in each direction and secured with single twine
1st Felt applied on pipe Lapped one to two inches and secured with single twine wound spirally on six inch centres
2nd, 4th & 6th One inch hair felt cut full with double twine wound spirally on one inch centres.
Rosin Sized Paper and 8 oz. canvas sewed on.

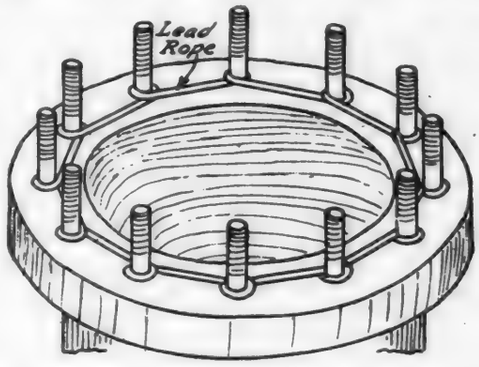
FIG. 2—METHOD OF INSULATING EXPOSED WATER LINES TO PROTECT FROM FREEZING.

hair felt alternating with single-layer roofing applied over the hair felt in 3-ft. sections. This is lapped 3 in, in each direction and secured with single twine while the three layers of hair felt mentioned above are cut full, with double twine wound spirally on 1-in. centres. The whole is then enclosed in rosin-sized paper and 8-oz. canvas sewed on.

An Emergency Gasket of Lead.

In an emergency, nearly any kind of a temporary home-made gasket may be substituted for the usual gasket, of which there may be none in stock. Some of these emergency gaskets, one of which is shown in the accompanying illustration, give surprisingly good permanent results.

In the case shown, the regular gasket has been blown out at a joint in the steam main and repaired with material quickly substituted, lead rope being inserted between the pipe flanges and wound around the bolts. Red lead and



METHOD OF USING LEAD ROPE FOR AN EMERGENCY GASKET.

linseed oil were added as a mixture and the gasket then flattened and spread by tightening the bolts, care being used so that the bore of the pipe was not obstructed by projections of lead. Asbestos rope placed inside of a light piece of lead pipe will also serve as a gasket.

Standard Method of Pipe Connections for Maximum Economy.

Piping connections to secure economy and efficiency are always important and usually several methods or combinations are possible in each instance. Many of these have been standardized in good practice as in Figs. 1 and 2, using by-passes so that the reducing valve or steam trap may be valved off for repairs.

A valve and gauge on each side of the reducing valve should be installed for reading the high and low pressures, while the reducing valve should, of course, be installed in the straight run of the main, something which is not always done. The valve is automatically controlled by the small pipe connected to the low-pressure side of the main. The by-pass, which is also valved, should not be more than one-half the diameter of the main, otherwise an excess pressure might develop on the low-pressure side.

The steam trap is provided with a water-gauge glass, air cock and draw-off, also the necessary unions for disconnecting when required. Fig. 3 shows an arrangement of piping connections at a tilting trap of the lifting type. This

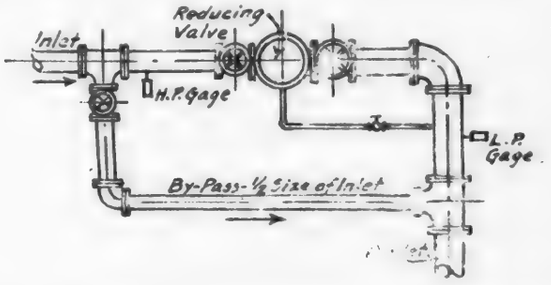


FIG. 1—TYPICAL PIPING CONNECTIONS FOR REDUCING VALVE.

trap is used where the pressure of the condensation is not great enough to carry the water to the point of delivery and has three valves, steam, vent and discharge. When the trap is filling the steam and discharge valves are closed, and the vent valve is open. The open-vent valve makes it impossible to have any pressure in the trap and low pressure condensation will flow into it. When the trap discharges this

vent valve closes and the steam and discharge valves open. The steam valve is connected to some source of pressure, usually the boiler, sufficient to move the water in the trap to its point of delivery through the open discharge valve. When the trap has discharged the steam and discharge valves close and the vent valve opens, relieving the pressure in the trap.

The lifting type of trap is of advantage, particularly in connection with a service water heater which has two coils, one for exhaust and the other for live steam. When the water in the heater reaches the temperature for which the thermostat is set, the regulating valve of the heater closes, cutting off the supply to the live steam coil. The steam in the coil then either partially or wholly condenses and we have at most only a slight pressure, possibly a

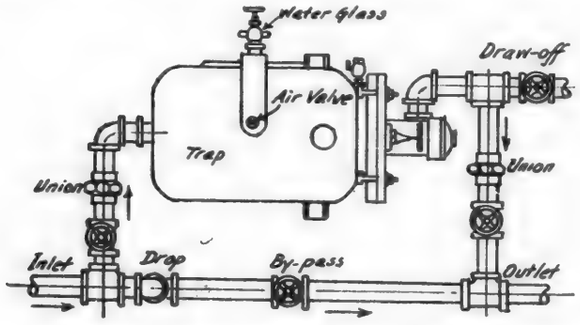


FIG. 2—TYPICAL PIPING CONNECTIONS AT STEAM TRAP.

vacuum, in the coil and the water of condensation will stay in the coil unless the pressure on the outlet is the same or lower than that in the coil. If, on the other hand, this coil is drained by a lifting trap which has its vent connected to the return from the coil, the pressure in the trap will always be the same as that in the coil and water will flow from the coil to the trap, regardless of the pressure in the coil. The exhaust coil should also be provided with a lifting trap since the pressure of the condensate is insufficient to lift the water to the point of delivery.

These traps must always be located below the level of the apparatus to be drained, and as they have no suction power, water must be delivered to the trap by pressure or gravity. Always lead the full size of a return or drain pipe close to the inlet of the trap, as shown in the sketch, and reduce at that point. A trap which has only a ¾-in. inlet may have ample discharge valve area and capacity to take care of all the condensation which a 2½-in. pipe will carry. As steam traps are always located at the lowest point of a system to be drained, use a sediment trap close to the trap in the inlet pipe to prevent the passage of foreign matter and from the bottom of the trap connect a blow-off cock for frequent cleanings. The arrow cast on the

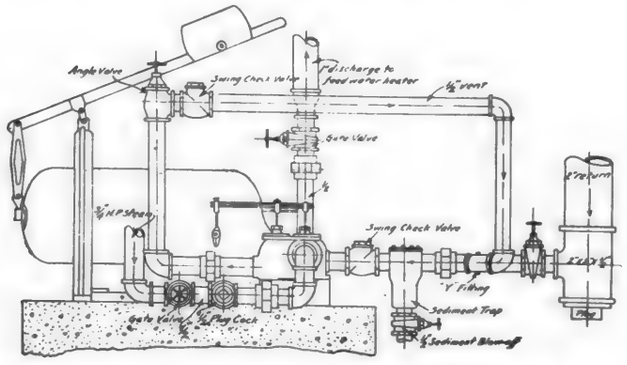
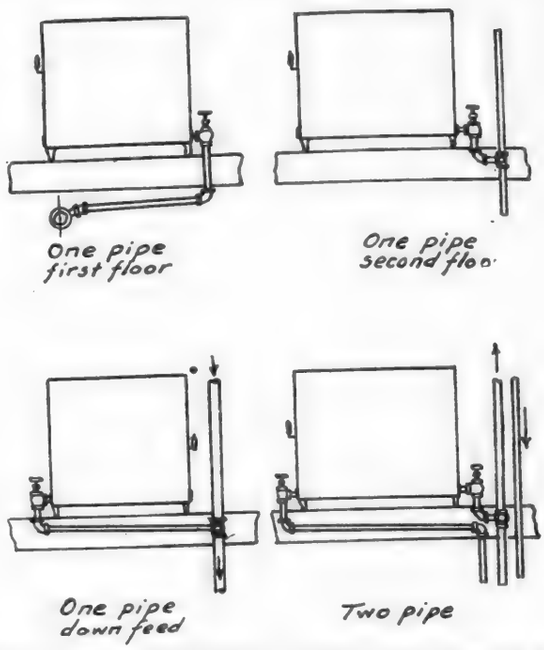
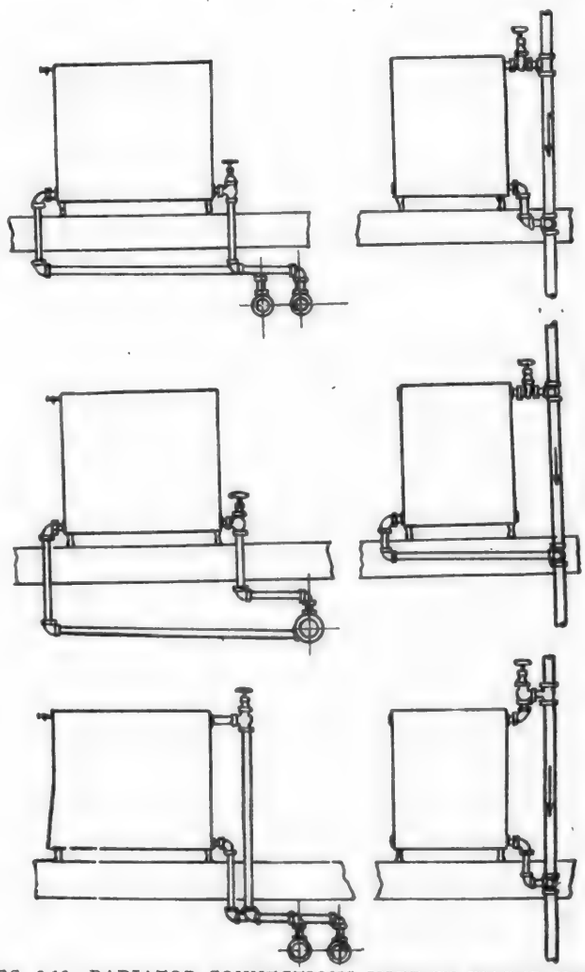


FIG. 3—STANDARD PIPING CONNECTIONS FOR STEAM TRAPS OF THE LIFTING AND TILTING TYPE.



FIGS. 4-7—VARIOUS RADIATOR CONNECTIONS USED IN STEAM HEATING INSTALLATIONS.

sediment trap should point in the direction of the flow of condensation. The sketch also shows, how the vent pipe is connected into the return with a Y fitting, the correct location for gate and check valves and how the discharge line is increased in size close to the trap.



FIGS. 8-13—RADIATOR CONNECTIONS USED IN WATER HEATING SYSTEMS.

The various ways in which radiators may be connected to give best results are shown in Figs. 4 to 7 for steam heating, and Figs. 8 to 13 for water heating. These connections are determined mainly by the type of system, whether one or two-pipe, and also by the location of the mains which may be run on the ceiling of the floor below or as risers adjacent to the radiators.

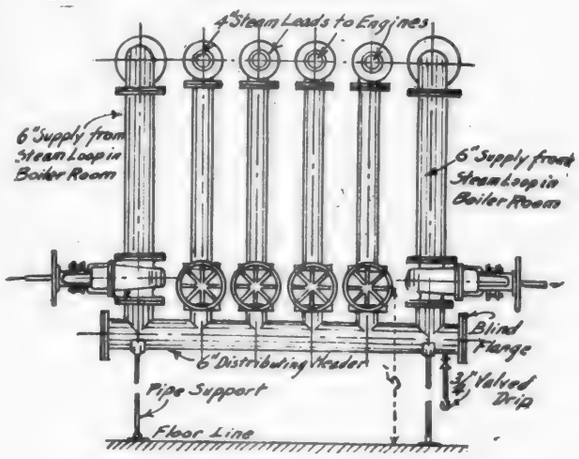

4" Steam Leads to Engines
6" Supply from Steam Loop in Boiler Room
6" Supply from Steam Loop in Boiler Room
Blind Flange
6" Distributing Header
Pipe Support
¾" Valved Drip
Floor Line

FIG. 14—CONVENIENT ARRANGEMENT OF IMPORTANT CONTROL VALVES WITH DISTRIBUTING STEAM HEADER.

More or less variations in practice exist in the arrangement of important steam valves which control leads to engine. Fig. 14 shows how these leads may be grouped in a neat-appearing manner and connected to a distributing header, each lead being valved for convenient control from the floor. The two outer pipes are valved and run full size of the mains to the steam loop in the boiler room.

LEGAL DECISIONS

Inspection of Low-Pressure Steam Heating Plants in Minnesota.

In an action by the owner of an eight-family apartment house in the city of Minneapolis, heated by means of a low-pressure steam boiler, which was under his personal management, against the boiler inspectors of the State to injoin collection of the statutory fee for inspection of the boiler the Minnesota statute of 1905 requiring the owner of such a boiler to have it inspected and to pay the inspection fee, was held effective regardless of the validity or invalidity of the amendatory statute of 1919. Whether low-pressure boilers used only to generate steam for heating purposes can or cannot carry enough steam is a question of fact. As a general rule, the determination by the Legislature of an open or debatable question of fact is not subject to review if the question is one which it has power to determine. By the act in question the Minnesota Legislature has in effect determined that low-pressure boilers used in heating plants may become dangerous and, therefore, should be inspected at stated intervals and not used unless they pass inspection. Such a determination is held by the Minnesota Supreme Court, Davidson v. Patnaude, 177 N. W. 495, to be one of fact and as effectual as a final judgment of a competent tribunal of general jurisdiction in a like case.

Custom and Usage of Trades and Express Contracts.

The New York Court of Claims holds, W. B. Armstrong Co. v. State, 181 N. Y. Supp. 185, that where a contract for the installation of heating and water supply expressly required the use of extra heavy pipe, evidence of a custom of the trade that those words in the contract did not mean anything is incompetent, since such custom is inconsistent with the expressed terms. Trade usage in relation to matters embraced in a contract, when reasonable, uniform, well-settled, not in opposition to fixed rules of law, and not in contradiction of the express terms of the contract, and when so far established and known to the parties that it may be supposed the contract was made in reference thereto, is deemed to form part of it, and evidence is always admissible to explain the meaning usage has given to words or terms used in a particular trade or business. But it is not competent to prove a custom or usage inconsistent with the express terms of a contract. Custom or usage is only resorted to to explain the intent of the parties to a contract when it cannot be ascertained without extrinsic evidence; never to contravene express stipulations. Where the terms of a contract are expressed in clear language, custom or usage of the trade cannot be resorted to or permitted to change the terms of the contract.

City Not Bound by Unauthorized Order for Material.

Action was brought for work and labor furnished on orders for heating and plumbing work on the heating system in the City Hall of Newark, the orders having been received from the chairman of the Public Building Committee of the city's Common Council. Subsequently the acting clerk of the Common Council testified the orders were not authorized by the city nor by the Public Buildings Committee. Previous bills presented by the plaintiff and paid had been authorized by the city. They were then presented to the Common Council and approved. The New Jersey Supreme Court holds, McLean v. Mayor & Common Council of City of Newark, 110 Atl. 692, that under that state of facts the city was not liable for the bills based on the orders. The case was held to fall within the rule laid down in prior New Jersey cases that a municipal corporation cannot be held bound, by either an express or an implied contract, in defiance of express restrictions, imposed by law as limitations on the powers of the corporate agents, through whose instrumentality the contract is sought to be derived.

Company Cannot Give Rebate Because Meter Is Defective.

A consumer of the Springfild Gas & Electric Company's steam heating service was duly billed for $65.81 for service. He refused to pay the bill, claiming it was excessive, and that something was wrong with the meter. The company, acting apparently in good faith and to avoid the trouble and expense of a lawsuit threatened by the consumer, accepted $50 in payment of the bill. The Illinois Public Utilities Commission directed the company to show cause why it had settled for an amount less than its filed schedule rates. About this time the heating plants of all the company's consumers were being inspected, and the company advised them what changes were necessary to heat the premises economically. In this case the consumer was told his bills were high because the building

had insufficient radiation and the pipes were uncovered to such an extent that an undue amount of steam was condensed. After a hearing the commission found that the consumer should have paid the bill as rendered and then filed a complaint with the commission asking for proper reparation, as provided for in section 72 of the Illinois Public Utilities Act providing for a hearing on complaints of excessive rates of overcharges; and also that the facts of the case did not justify the company in making a settlement for an amount less than stated in the bill.

A Well-Arranged Pump Room Illustrating the Air Separating Tank and Other Usual Heating Devices.

The accompanying photograph, taken in the plant of the General Vehicle Co., in Long Island City, shows a well-lighted and neat-appearing pump room, with piping arranged so that long supports from the ceiling are not required.

Radiators are installed to heat the room since the piping is thoroughly covered throughout. Vacuum return pumps may be seen in a pit at the left, the pit being provided with stairs for convenient access. A hand rail is also installed at the stairs and around the pit opening; in fact, this practice is followed throughout, the air separating tank being made accessible by means of a ladder and the valves at the by-pass of the reducing valve controlled from a platform. This platform is quite an advantage when steam

PUMP ROOM IN PLANT OF GENERAL VEHICLE CO., LONG ISLAND CITY.

is first turned on the cold heating system, considerable time elapsing before the engineer has fully opened the by-pass valve. If this is not done, the resulting expansion and water hammer will cause leaky joints and may even burst fittings.

The vacuum return pumps discharge to the overhead return or air-separating tank from which the air is vented, as shown, and the condensation then leaves by the other vertical pipe to the suction of the boiler-feed pump. The tank is also equipped with a small overflow pipe and a cold water connection with automatic or float controlled inlet valve for make-up water. Equalizing pipes are extended from the tank to the top and bottom of this automatic feeder. This tank also receives the cooling water discharged from the jackets of the air compressor. The method of supporting is clearly shown and consists of steel rods bracketed to the wall at one end and hung by rods and stirrups at the other end to the roof construction.

CORRESPONDENCE

Legislation on Ventilation of Moving Picture Theatres.

EDITOR HEATING AND VENTILATING MAGAZINE:

Can you inform me if there is any legislation either in New York State or in any other place, in regard to the ventilation of moving picture theaters?

Troy, N. Y. J. H.

The foregoing inquiry was referred to Frank T. Chapman, through the American Society of Heating and Ventilating Engineers, Mr. Chapman having served as chairman of the society's committee which drew up the requirements for model compulsory ventilation laws, including those for motion picture theaters. In reply to the inquiry, Mr. Chapman states:

"The Department of Health of New York City adopted certain standards for ventilation in the City of New York on December 11, 1917. They are supposed to apply to all classes of buildings.

"The City Board of Aldermen Code of Ordinances, City of New York, has certain requirements for ventilation of moving picture exhibitions which will be found in this code, Article 2, Section 39, Page 38. The requirements are based on 500 cu. ft of air per hour per occupant, which is less than half of what prominent engineers and health officials believe to be necessary for proper ventilation, under moving picture show conditions. Should you desire to secure a copy of the Board of Aldermen Code of Ordinances, I believe you can do so from the Brooklyn Daily Eagle, at a moderate charge of about 75 cents.

"I enclose copy of the report of a committee of the American Society of Heating and Ventilating Engineers on "Minimum Ventilation Requirements for Public and Semi-Public Buildings for Legislation Purposes."* You will find special reference to theaters in Section 4, in the pamphlet. I believe the City Department of Health, City of Buffalo, is undertaking to enforce conditions about as stated in this report, or, at least, it was a few years ago."

Chimney Data Sheet No. 100-I.

EDITOR HEATING AND VENTILATING MAGAZINE:

I should appreciate seeing in THE HEATING AND VENTILATING MAGAZINE an explanation of the method by which you arrive at the following conclusions in your Data Sheet No. 100-I:

"For points above sea level the reading (theoretical draft) will be less than that shown in the table, the percentages being for:

2000 ft.	97%
4000 ft.	94%
6000 ft.	92%
8000 ft.	89%
10000 ft.	86%

"Thus, a chimney 50 ft. high at 500° F. temperature at sea level should have a draft of 0.26, but at 6000 ft. elevation it should have 0.26 x 0.92, or 0.24 in."

*Published in THE HEATING AND VENTILATING MAGAZINE for April, 1916.

Since the theoretical draft varies inversely as the barometric pressure, why should not the percentage at 10,000 ft. be 10 ÷ 14.7 = 68%?

Buffalo, N. Y. C. H. F.

Our correspondent has caught an error which, fortunately, relates to a draft which is theoretical only and in nowise affects the various tables or subsequent figures. It has ordinarily been assumed that a stack height for altitude will be increased inversely as the ratio of the barometric pressure at the altitude to that at sea level, and that the stack diameter will increase inversely as the two-fifths power of this ratio The error seems to have occurred through the unintentional use of the latter part of the above assumption relating to the increase of stack diameter, whereas that portion referring to the height should have been used.

With the necessary corrections, the percentages given should read 93, 86, 79, 74 and 68, respectively, making, in the example given, 0.205 in., instead of 0.24 in. Incidentally, the stack temperature is given in the data sheet as 250° F., and not 500° F.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Annual Meeting to Be Held in Philadelphia.

The proposal to hold the annual meeting of the American Society of Heating and Ventilating Engineers in Philadelphia has been accepted by the council of the society. To comply with the society's constitution, a preliminary business session will be held in New York, January 25, 1921, and adjournment taken to Philadelphia where the professional sessions will be held, probably on Wednesday, Thursday, and Friday, January 26, 27 and 28.

The decision to meet in Philadelphia this winter is a tribute to the Eastern Pennsylvania Chapter which now boasts of a membership of 150, making it the largest chapter in the society. Former President John F. Hale, now a member of the Eastern Pennsylvania Chapter has been active in inducing the council to fix on Philadelphia for its annual meeting and the members in Philadelphia have already taken steps to prepare a welcome worthy of the occasion.

Research Bureau's Program.

With the beginning of its second fiscal year, the Bureau of Research of the heating engineers' society announces the following program of work:

Radiant Heat Loss from Steam Radiators.

Heat Losses from Pipes Buried in the Ground.

Circulation of Water in Water Heating Systems.

Heat Losses Through Various Building Materials.

Electrical Method of Testing Radiators.

Infiltration Through Various Forms of Building Construction.

Relation Between Outside Wall Temperatures and Dew-Point.

Standardization of Dust Measurements.

Checking Application of Heating Boiler Testing Code.

The constant-temperature room needed for certain phases of heat-transmission investigations has been completed and now awaits the installation of the refrigerating equipment. Also a Whalen gage has been completed and an electric boiler, with automatic regulator, for radiator testing, is under construction. Also work has commenced on a heating plate for testing thermal conductivities of various materials used in building construction.

NATIONAL TRADE EXTENSION BUREAU

Conditions T. E. B. Found in One of the Large Cities.

Full details of the survey made by the National Trade Extension Bureau recently of the books of a majority of the heating and plumbing contractors in Cleveland are given in the "T. E. B. Monthly Service Bulletin" for August. The accompanying table is a copy of actual figures taken from the books of sixteen contractors covered by this survey.

The shops are divided into two classes, Class A covering those that do from $100,000 to $300,000 volume per year, and Class B those doing from $35,000 to $100,000 volume per year.

Particular attention is called to shop No. 1 in Class A. Here is a shop doing a trifle more than $100,000 volume per year where the executives' salaries combined amount to only $7,800 per year. This, comments the bureau, is not enough. Moreover, many other items of expense necessary for the conduct of a growing business are not shown in column 1. This firm kept no accurate record of non-productive labor, nor did it figure depreciation on equipment, advertising, taxes, association dues, and bad accounts, except where such items occasionally were charged in "Miscellaneous Expense." Even with underpaid executives, the overhead in this shop amounted to 11½% on costs.

In the line indicating T. E. B.'s idea of "overhead," it is stated that the salaries in shop No. 1 in Class A should be increased by $5,400 per year. The total is then not more than the executives could earn in the employ of anyone else to do the same work. This would increase shop No. 1's overhead to 18%. Even then the business would be operating on a low percentage of "overhead," considering the volume. As it was the concern showed less profit than any of the others on which the survey was made.

Shop No. 5 is characterized as representing a well-regulated business. The system of accounting used by this firm was found to be very good. In this shop the owners drew good salaries and the office help was well paid. The salaries paid to the executives and office help represented 13.6% of the total cost of merchandise and labor. This is thought to be about correct. The labor in this shop was 31% and the material was 69% of the total cost. This, it is held, shows a well-regulated business, for the cost of labor should not represent more than 33⅓% of the total cost of merchandise and labor sold during the year.

Attention is next called to shop No. 7 in Class A. This firm did a volume of business aggregating $250,000. It paid its executives (owners) and office help salaries amounting to more than $37,000. This, of course, made their "overhead" very high. In the survey it proved to be 27.4%. Yet this firm made a very satisfactory net profit on the year's volume—one that netted the government a nice sum for excess profits tax.

It will be noted that the Trade Extension Bureau suggests a decrease in salaries in shop No. 7 of $10,000 per year. This was done because the salary list of this organization is above the normal percentage for the volume of business done. In reality the bureau recommends that shop No. 7 should continue as it has been operated, as long as it can show the profits that it has shown in the past.

The next shop that reveals some interesting facts is shop No. 1, Class B. The "overhead" expense in this shop was 15% on costs, even though the two owners did not draw one

CLASS A	%	1	%	2	%	3	%	4	%	5	%	6	%	7	%	8	%	9	%	Total
Labor	32.5	$30700	39.0	$35169	21.0	$47576	27.0	$38718	31.0	$59118	16.0	$17863	36.0	$77713	37.5	$60289	23.0	$40249	29.0	$400396
Material	67.5	63498	61.0	55464	79.0	177365	73.0	105623	69.0	132263	84.0	94962	64.0	136114	62.5	99334	77.0	133355	71.0	997979
Total Direct Cost	100.	94198	100.	90632	100.	224942	100.	144342	100.	191381	100.	112825	100.	213827	100.	159623	100.	173604	100.	1405375
Overhead																				
Executive Salaries		3492		10400		4145		13000		20000		6685		22000		3120		10000	11.7	93442
Estimating and Selling	8.2	4265	16.3	1662	6.3	2977	12.4	1200	13.6		11.7	3668	19.0	10000	8.4	2526	9.6	5023		31320
Office Salaries				1318		1202		1846		3345		1636		5020		5524		1006		20902
Non-Production Labor				1453		5269		1795		2362		1314		3626		2155		650		18623
Auto and Truck Expense	1.0	968	3.7	3346	0.7	1685	2.8	4069	3.2	6007	3.2	3593	1.9	4010	2.9	4615	1.6	2862	2.2	31156
Rent	0.3	320	0.5	522	1.0	2175	0.7	1020	0.9	2067	0.9	1100	1.2	2475			0.3	556	0.7	10234
Depreciation on Equipment			0.3	343	0.1	233	0.4	632	0.5	1000	0.8	925		96		100			0.2	3335
Repairs and Replacement					0.5	1138	0.3	388	0.2	379					0.5	847			0.2	2753
Advertising			0.3	337					0.1	270						125				732
Taxes			0.5	447	0.1	366	0.1	137	0.2	485	0.7	143	0.4	859	0.9	1410		146	0.3	3994
Interest	0.1	149			0.2	500	2.0	2870		43	0.3	408					0.1	273	0.3	4243
Insurance	0.2	237	0.3	324	0.3	649	0.4	648	0.5	975	0.5	573			0.7	1007	0.4	164	0.4	5178
Association Dues			0.4	276	0.4	876	0.4	627	0.8	1465	0.3	375	0.5	913	1.7	1718	0.2	334	0.4	5296
Bad Accounts			0.7	306	0.7	1500	0.3	445		45	0.7	783	1.3	2821		154	0.2	300	0.5	6354
Miscellaneous Expense	1.7	1618	.9	1075	0.9	2216	3.2	4682	1.6	3017	2.3	2650	3.2	6721	0.9	1541	1.7	2868	1.9	27677
Total Overhead on Cost	11.5	$11048	24.	$21809	11.5	$25531	3.2	$33360	21.7	$41461	21.	$25853	27.4	$58546	15.6	$24842	14.3	$24782	18.9	$262232
T. E. B.'s Idea of Overhead																				
Salary Should be Increased		5400				17300		2300				2000				9000		8000		28000
Salary Should be Decreased				5400										10000						
Overhead Cost	18.	$16448	18.	$16409	19.	$42831	24.5	$35660	21.	$41461	24.7	$27853	23.	$48546	20.	$34842	18.	$32782	21.	$290832

CLASS B	%	1	%	2	%	3	%	4	%	5	%	6	%	7	8	9	%	Total
Labor	50.	$14394	37.5	$14960	28.	$17537	32.0	$17362	33.	$22618	26.0	$9020	28.0	$9837			33.	$105729
Material	50.	15884	62.5	24840	72.	44517	68.0	36989	67.	45235	74.0	25440	72.0	25341			67.	217946
Total Direct Cost	100.	30276	100.	39800	100.	62054	100.	54351	100.	67853	100.	34162	100.	35178			100.	323675
Overhead																		
Executive Salaries				4620		4200		9600		5263		3120		3120				29923
Estimating and Selling	6.0		16.9		18.5	4488	23.0		9.2	1011							14.2	5500
Office Salaries		240		540		1705		923										3408
Non-Production Labor		1599		1560		1199		1988						365				6712
Auto and Truck Expense	0.3	100	1.1	434	3.0	1843	1.3	713	1.2	779							1.2	3869
Rent	2.6	780	2.8	1125	1.2	780	0.8	430		450	1.0	360	1.7	612			1.4	4537
Depreciation on Equipment	0.6	182			0.1	62	0.3	164		541			0.3	100			.3	1049
Repairs and Replacement					0.9	550	1.0	565		156	0.6	200					.4	1474
Advertising					0.2	127												127
Taxes			1.0	370	0.6	350	0.4	209					0.1	33			.3	962
Interest					0.05	38	0.3	188										226
Insurance			0.5	232	0.7	435	0.3	191					0.2	67				925
Association Dues					0.7	417	0.1	548					0.8	298			.4	1363
Bad Accounts					0.2	107		27										134
Miscellaneous Expense	5.7	1707	2.6	1143	1.4	890	1.6	887		2911	5.3	1800	6.0	2119			3.5	1457
Total Overhead on Cost	15.	$4608	25.	$10024	27.7	$17191	30.	$16435	16.	$11114	16.	$5480	19.	$6713			22.1	$71566
T. E. B.'s Idea of Overhead																		
Salary Should be Increased		2738								4260		1640		1780				6518
Salary Should be Decreased				500		3000		500										
Overhead Cost	24.	$7446	23.5	$9424	23.	$14191	21.	$15935	23.	$15374	21.	$7120	24.	$8493			24.	$77884

cent of salary and only employed a girl part of the year, who drew the small sum of $240. The bureau believes that the non-productive labor in this shop is too high and that the $1599 for non-productive labor should be added to the $2738 the bureau shows as an increase in salaries, and the combined figure paid to the owners. (If the $1500 was paid to the owners, it should have been charged to salaries, and not to non-productive labor). This increase would bring the "overhead" up to 24% on cost, which is a low "overhead" in a shop doing $35,000 worth of business per annum. The profits in shop No. 1, in Class B, were less than 2% on the sales.

The bureau's comment in the cases of shops Nos. 2, 3 and 4, Class B, is that the owners are all drawing too much money for the volume of business done, while in shops Nos. 5, 6 and 7, they were not drawing sufficient salaries.

Nation-Wide Information Campaign on Business Management.

A practical and easily-worked scheme for spreading information among heating and plumbing contractors on subjects which vitally affect their prosperity has been inaugurated by the National Trade Extension Bureau. The bureau has had occasion to come into close contact with the business methods generally followed in these trades and has observed to what a small extent the average contractor has made use of the many published suggestions on better business methods. Recognizing this fact the bureau proposes to place at the disposal of every local association of heating and plumbing contractors an easy study course of those matters which are basically of value to them in their efforts to run and manage a profitable business.

The first step in the campaign is in the form of a letter which is being sent to every heating and plumbing contractor on the bureau's mailing list. Any contractor who does not receive one of these letters is entirely at liberty to take advantage of its publication and fill out and send in to the bureau's headquarters, in Evansville, Ind., any one of the application blanks that go with the letter.

The letter states, among other things, that the foundation of the present campaign was laid during the last year by the bureau's publication of the first, second, third and fourth "Steps in Business Efficiency for the Plumbing and Heating Contractor," and the "T. E. B. Monthly Service Bulletin." The letter then goes on to state that the business-building information at the command of the National Trade Extension Bureau will be arranged and subdivided into a series of short, meaty lessons or lectures which will be offered to and placed at the disposal of every local association in the United States. They will be prepared in language and put together in a shape that anyone can understand. They will be accompanied by suggestions and other material that will make clear all the points covered. All necessary printed matter will be furnished and everything will be worked out along practical lines.

At regular "get together" meetings of the local associations it is proposed to make these lessons the subject of special study and discussion. The bureau feels that the discussions at meeting is bound to bring out additional information of distinctly local value that would take years for one to pick up in any other way. The plan also provides that every contractor will be furnished with the material for the next lesson in advance of the meeting.

If any contractors are not members of the local association, or if there is no association in any particular locality, the bureau will undertake to see that such contractors will have the privilege of attending the meetings of the nearest local association on these special occasions. If this is impracticable, such contractors are urged to form an educational local association and the bureau will furnish the necessary material direct.

Accompanying the letter are three forms of pledge to be used, respectively, by members of a local association, by non-members and by those in localities where there are no organizations of contractors.

Information Wanted on Workmen's Compensation Insurance.

With the intention of securing equitable adjustment of premium rates for workmen's compensation insurance, the National Trade Extension Bureau is securing from heating and plumbing contractors throughout the country facts drawn from the contractors' own experience, as to the cost of premiums for such insurance. With the facts thus gathered the bureau intends to make this insurance less expensive and more fairly proportioned to the risk taken by the insurance companies.

Accounting the Big Problem in the Contracting Trade.

Based on the data obtained by the National Trade Extension Bureau, the bureau states in its Monthly Service Bulletin for July, that 98% or more of the failures in the heating and plumbing trades is due primarily to incomplete methods of accounting.

The time has arrived, it is stated, when each contractor should ask himself these questions: Do you know what your business is doing for you in each of its branches? Do you know how each branch can be improved? Do you know which job is paying you and which one is not? Is every job producing a just profit? Do you estimate, "guessimate" or know your overhead? Is the business paying every one connected with it the salary he is entitled to?

Unless you can say "Yes" to all of these questions, the Bulletin continues, without an "if" or a "but," your accounting system is not in proper shape. The average man in business, it is added, often puts off installing a new system in his business because he feels that he is tackling a big job. The truth of the matter is that he is tackling a bigger job if he attempts to run a business without a well-balanced system.

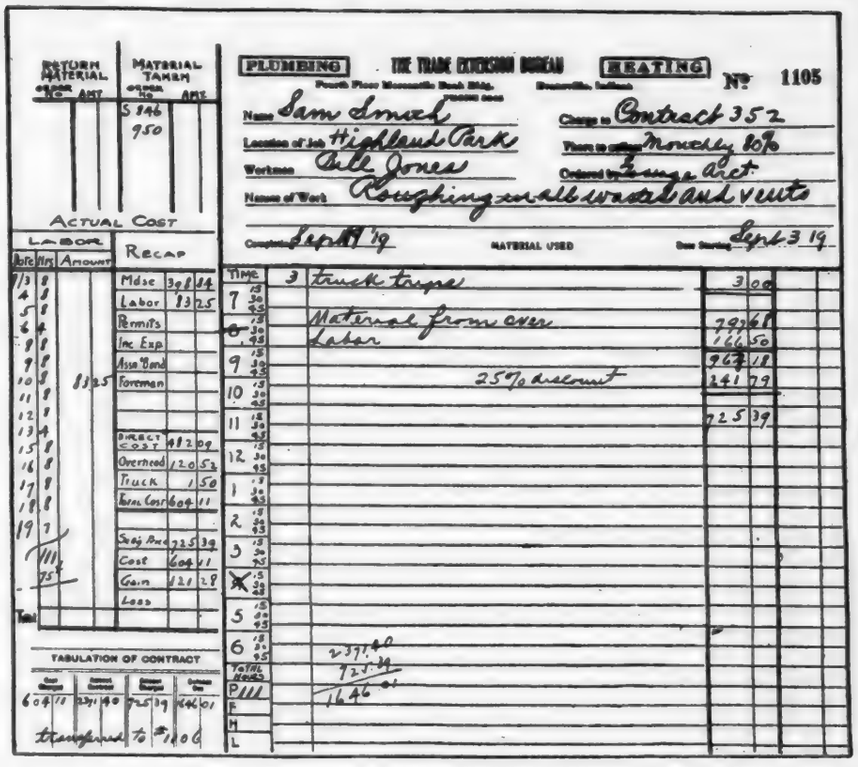


FIG. 2—SUGGESTED "JOB RECORD" SHEET.

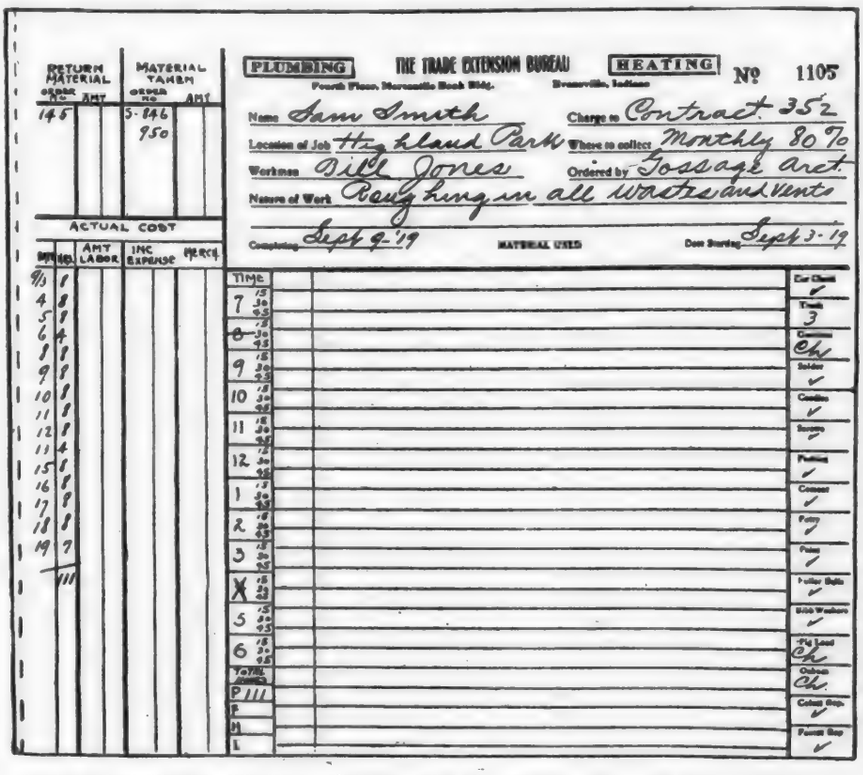


FIG. 1—FORM OF "WORKMAN'S ORDER" BLANK SUGGESTED BY NATIONAL TRADE EXTENSION BUREAU.

In an effort to improve the accounting systems of the average contractor the bureau calls attention to a form it has prepared of a "Workmens Order and Job Record," or charge, sheet, which the bureau is prepared to furnish in pads of 50 sets. When the "Workmen's Order" is made out, a carbon is placed under it, making a permanent record on the duplicate or "Job Record" sheet. This makes it easy to open the account in the books at the same time the order is made out to do the work.

As the work progresses space is provided on the reverse side of the "Charge Sheet" to keep track of all material and when the job is completed, a column is provided for crediting any material returned. Then the cost of labor and material, as well as the selling price, may easily be figured.

At one side of the "Job Record" sheet a "recap" column is provided for tabulating cost, gain, etc., the whole giving a complete history and knowledge of the job. All operations pertaining to these sheets are fully explained in the bureau's Accounting Booklet, Part IV, which will be furnished on application.

Contractors are urged first to order a small quantity of these "Workmen's Order and Charge Sheets" from the bureau direct and have them printed at their local printers. The bureau's charge is $19.00 per thousand sets, padded in sets of 50 sets each, including the numbering, perforating, etc. The bureau can also supply full size plates or cuts of these forms, three in number, at $10.50 per set, postage paid.

The time to figure the cost of a job, it is pointed out, is at the time the job is in progress, or, if a small one, immediately upon completion.

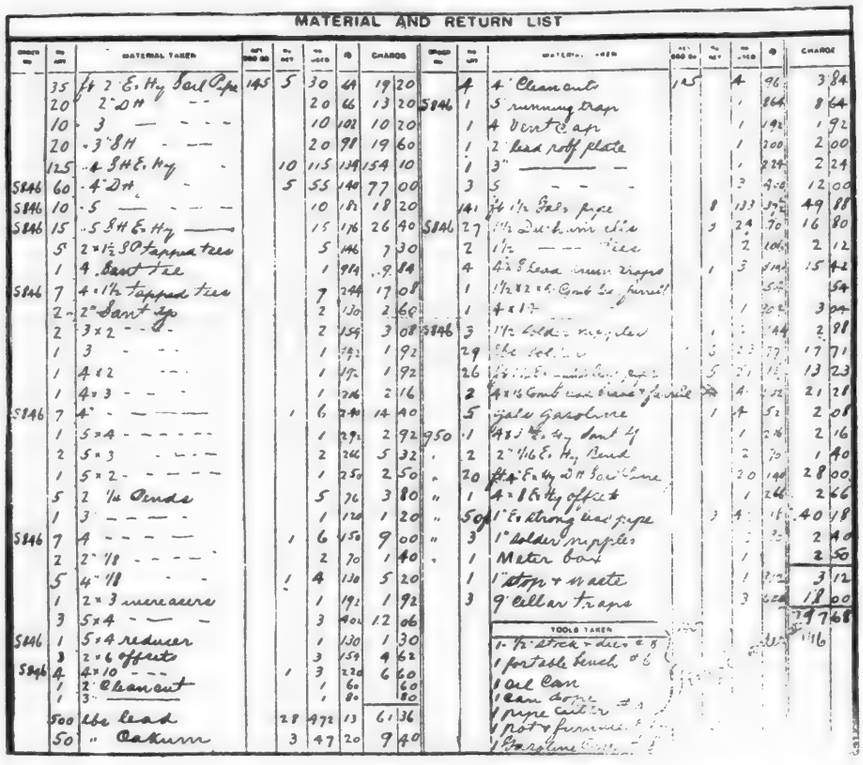

MATERIAL AND RETURN LIST

FIG. 3—REVERSE SIDE OF "JOB RECORD" SHEET, SHOWING CHARGES AND CREDITS FOR MATERIAL.

PRESENT STATE OF THE ART IN SMOKELESS BOILER CONSTRUCTION

Editor's Note.—The notable increase in the number of designs of smokeless boilers, together with the wide interest manifested in the various types presented in lastm onth's issue, have suggested the publication of a series of short descriptions of the leading makes. While each description will be based on manufactors' statements, an endeavor will be made to include only such matter as will be of service to the reader in making comparisons and in selecting a suitable type for a given duty.

1.—International Economy Smokeless Boiler.

Built on the principle that temperature, mixture and time are the three factors necessary to properly burn the volatile smoke gases of soft coal, the International Economy Smokeless Boiler is a comparatively recent design. It is manufactured by the International Heater Co., Utica, N. Y. The furnace or heat-generating portion of this boiler consists of two principal parts—the fire-box and the combustion chamber. The fire-box contains the fuel, and is arranged to gradually distill the volatile gases from the fuel in a manner similar to a gas retort. The combustion chamber back of the fire-box is divided into the primary and secondary combustion chambers by the two fire-brick wing walls. These brick walls extending from the sides of the boiler have a perpendicular opening between them at the center of the boiler, through which pass the hot gases. The function of the brick wing wall is to maintain a high temperature of the gases and to give a thorough mixture of the combustible gases with the air.

The primary combustion chamber—that between the bridge wall and the wing walls—gives the necessary temperature and mixture of air and gases for combustion. The secondary combustion chamber, back of the wing walls, furnishes the time element by continuing the combustion process of the primary chamber.

It will be seen that the design of the smokeless feature of this boiler is along the lines of the Kent wing-wall furnace, and also that known in the West as the Chicago smokeless furnace, as specified by the Chicago Smoke Department for power installations.

By referring to the illustration it will be noticed that excess air is admitted over the fire through the fire-door. A deflector in the fire-door throws the air down upon the hot fuel bed, thereby raising the air to a high temperature. In addition, this arrangement provides for a long travel of the heated air over the entire length of the fire, assisting in the mixture of the air and combustible gases. With the air admitted in this manner it is also easy for the fireman to have convenient control of the air supply to suit the demands.

The center method of firing soft coal is recommended as the best for this boiler. With this method, the lumps of hot fuel are broken up and pushed part to the rear and part to the front, leaving a thin layer of hot coal over the center portion of the grates. The fresh fuel is then piled in the center of the fire-box, leaving a margin of hot fuel across the front and back to burn the combustible gases.

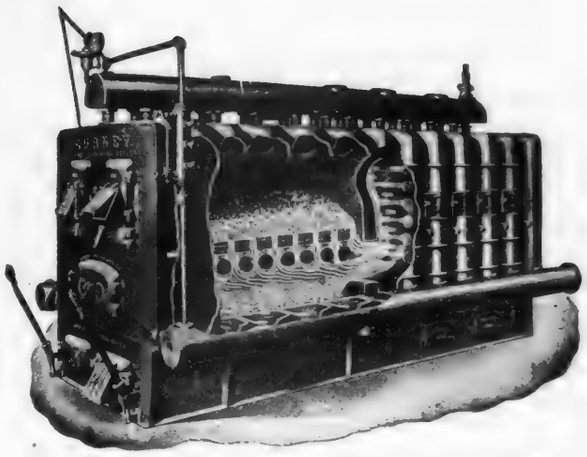
INTERNATIONAL ECONOMY SMOKELESS BOILER.

2.—Gurney Down-Draft Smoke-Consuming Boiler.

Gurney down-draft smoke-consuming boilers embody all of the well-known features of the Gurney Bright Idea water-tube construction, with the addition of a water-tube grate and down-draft principle. The upper grates are hollow and are filled with water, which, with the tubes immediately below them, are entirely surrounded by fire and constitute active and effective heating surface. The design also provides for a large amount of prime fire surface.

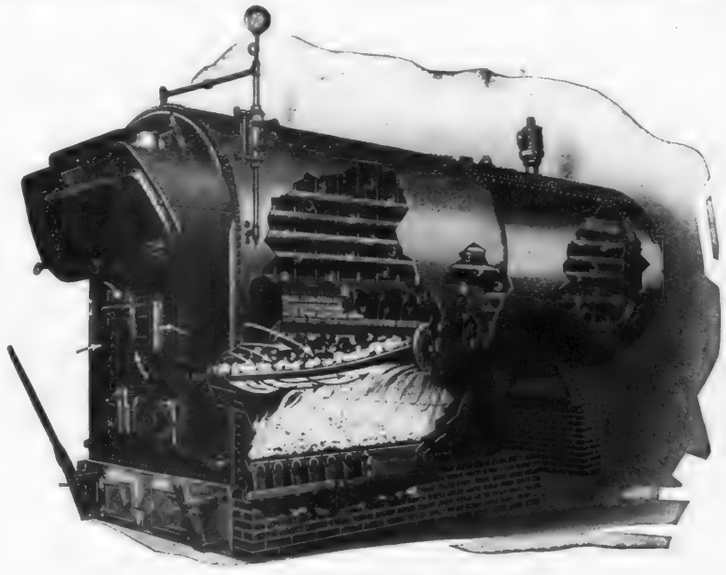
These boilers are of the header type, resulting in large steam reserve space. The headers are connected to the sections by extra-heavy 3-in. nipples, with heavy lock nuts. All other parts of this boiler are identical with the regular Gurney Bright Idea construction. The manufacturer is the Gurney Heater Co., Boston, Mass.

The fuel is fed into a small coking oven which is surrounded by thin layers of water. The bottom or grate of this chamber is made of tubes of cast-iron containing water. As combustion begins, particles of incandescent fuel drop through the tubes and form a bed of burning coals on the lower grate, akin to incandescent coke. The heavy gases pass down through these tubes and as they pass over the glowing embers on the lower grate they burst into an intense white flame. As this flame is established, it is conducted into the com-



GURNEY DOWN-DRAFT SMOKE-CONSUMING BOILER.

bustion part of the boiler, which is described as really a gas-burning boiler by itself. This part is built to provide a notably long fire travel.



OIL CITY SMOKELESS BOILER.

While other boilers make use of this principle the manufacturers point out that one exclusive feature is that the openings between the sections in the bottom of the gas-making chamber are so made that they are readily cleanable. Another feature is the peculiar design of the gas-burning sections, intended to insure the complete combustion of the gases and at the same time provide for a long fire travel and the most effective exposure of the water to the heating action. The water travel is vertical.

3.—"Oil City" Smokeless Return-Tubular Fire-Box Boiler.

The "Oil City" smokeless boiler is of the self-contained return-tubular fire-box type, fitted with a water, or down-draft grate. It is designed to meet the requirements of laws adopted by many of the larger cities to eliminate the smoke nuisance. As will be seen, it is a combination of the locomotive and horizontal tubular construction, in which the return flues of the horizontal tubular type are added to the internally-fired type, eliminating from the former the brickwork setting.

In the construction of this boiler the furnace is surrounded by a steel water jacket. The coal is fired on the upper or water grates. The products of combustion pass downward through the water grates over the hot fire in the lower grates where the heavy smoke particles are eliminated.

The gases then travel on through the tubes, which are small in diameter, permitting them to be made of uniform thickness of metal. Friction, it is pointed out, causes the gases to roll when passing through the tubes, thus bringing them repeatedly in contact with the tube surface.

Attention is called by the manufacturers to the fact that they have specified for these boilers the thickness of plates, details of laps, spacing and size of rivets, size and spacing of bolts and braces, and other details of construction to meet the requirements of high-pressure work. Although the boilers are sold for low-pressure heating purposes, they are all tested to 150 lbs. hydrostatic pressure; they are built of flange steel. The manufacturers are the Oil City Boiler Works, Oil City, Pa.

4.—Novelty Smokeless Boiler.

One of the latest types of smokeless boiler is that known as "the boiler with the carburetor," manufactured by the Abram Cox Stove Co., Philadelphia, Pa. The carburetor principle, it is stated, involves a new theory in boiler construction. With this arrangement all the smoke that enters the carbureting chamber is converted into fully ignited gases which pass out of the carbureting chamber and follow the normal course of upward travel, coming in contact with every part of the heating surface. By igniting these gases the temperature is greatly increased so that the gases passing from the carbureting chamber have a higher temperature than the gases in the fire chamber before entering the carburetor. In this way what is indirect heating surface under ordinary conditions becomes prime heating surface.

Novelty smokeless boilers are designed to burn either hard or soft coal. It is stated that the firing period may be as long as twelve hours.

Among the advantages mentioned for this boiler is its low water-line. No matter how large the boiler, the water-line remains 53 in. The boiler is of the side-feed type so that the depth of the boiler from the feed opening to the back is the same whether it is a 4-section or a 15-section size.

The design of the sections constitute practically a water-tube boiler and the wings on the sides of the tongues, which project downward to the fire chamber, are designed to further increase the boiler's efficiency.

It is announced that overwhelming approval of a platform setting up twelve principles of industrial relations (published in THE HEATING AND VENTILATING MAGAZINE for July, 1920), has been given by the membership of the Chamber of Commerce of the United States in a referendum vote.

At the same time the membership, in another referendum vote approved the report of its Committee on Public Utilities recommending that strikes by public utility employees should be explicitly prohibited and that tribunals should be created by law to adjudicate in decisions binding on both parties differences between public utilities corporations and their employees.

NOVELTY SMOKELESS BOILER.

PSYCHROMETRIC CHART

BAROMETRIC PRESSURE 29.92 INCHES MERCURY

BY

E. V. HILL

DIVISION OF VENTILATION DEPARTMENT OF HEALTH

CHICAGO

Directions for use of Chart:

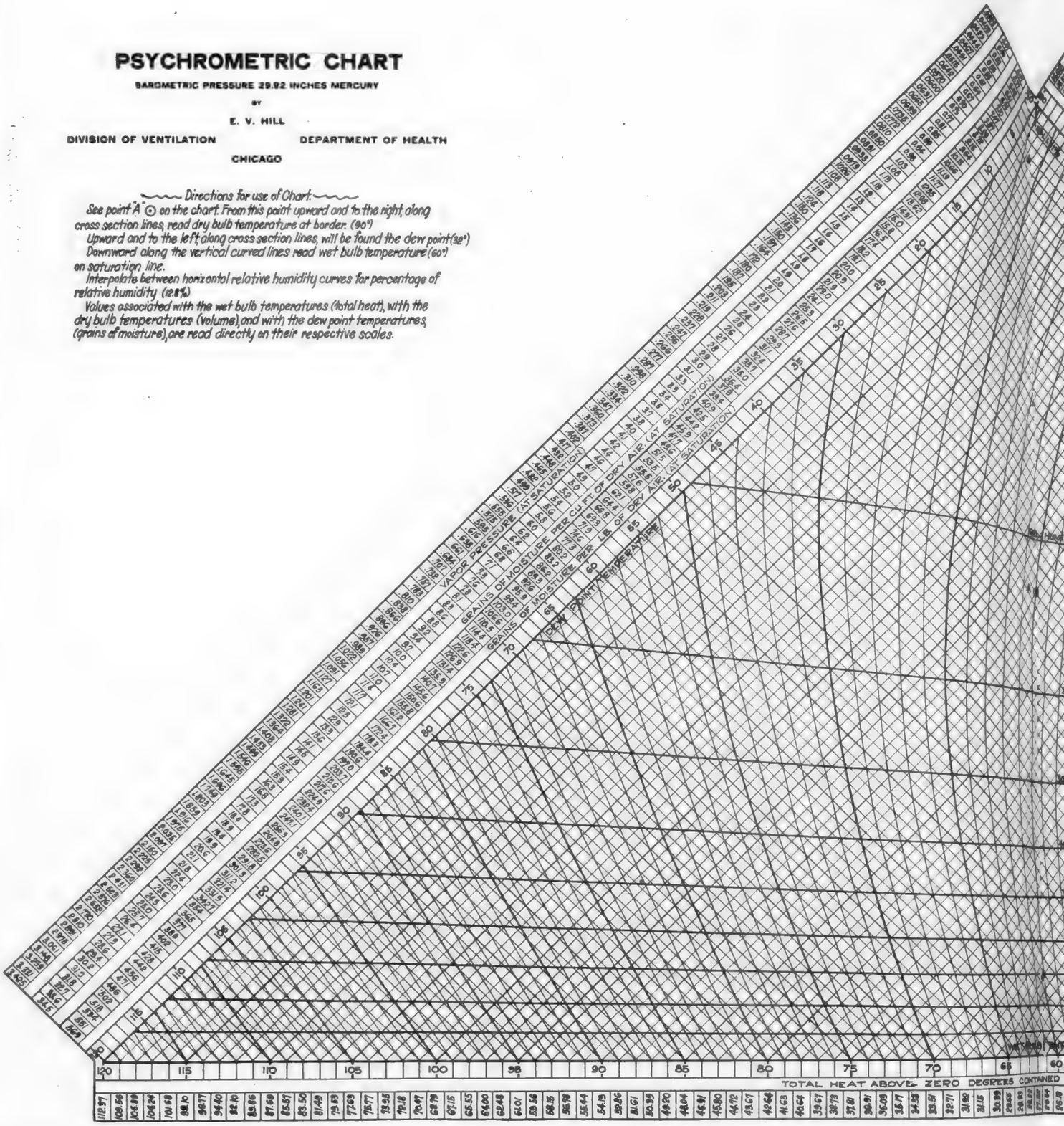
See point "A" ⊙ on the chart. From this point upward and to the right along cross section lines, read dry bulb temperature at border. (90°)

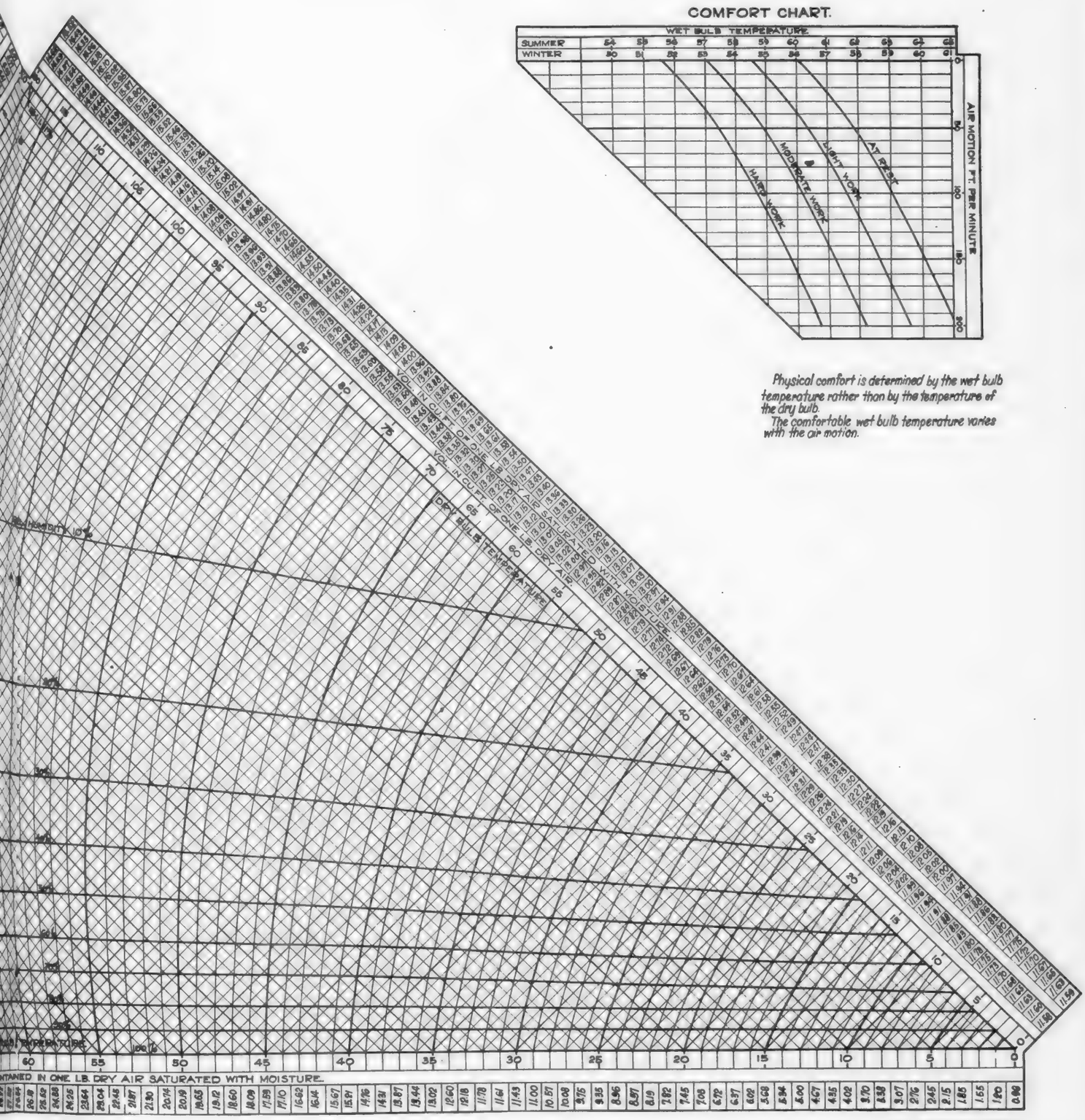
Upward and to the left along cross section lines, will be found the dew point (32°)

Downward along the vertical curved lines read wet bulb temperature (60°) on saturation line.

Interpolate between horizontal relative humidity curves for percentage of relative humidity (12.8%).

Values associated with the wet bulb temperatures (total heat), with the dry bulb temperatures (volume), and with the dew point temperatures, (grains of moisture), are read directly on their respective scales.


VAPOR PRESSURE (AT SATURATION)
GRAINS OF MOISTURE PER CU.FT. OF DRY AIR (AT SATURATION)
GRAINS OF MOISTURE PER LB. OF DRY AIR (AT SATURATION)
DEW POINT TEMPERATURE
TOTAL HEAT ABOVE ZERO DEGREES CONTAINED


COMFORT CHART.
WET BULB TEMPERATURE
SUMMER
WINTER
AIR MOTION FT. PER MINUTE
AT REST.
LIGHT WORK.
MODERATE WORK.
HARD WORK.
Physical comfort is determined by the wet bulb temperature rather than by the temperature of the dry bulb.
The comfortable wet bulb temperature varies with the air motion.
DRY BULB TEMPERATURE
VOL. IN CU. FT. OF ONE LB. DRY AIR AND ITS ACCOMPANYING MOISTURE.
WEIGHT IN GRAINS OF MOISTURE CONTAINED IN ONE LB. DRY AIR SATURATED WITH MOISTURE.
Copyright 1920 by E.V. Hill.

PSYCHROMETRIC CHART.

NOTES ON GAS HEATING AND THE MANUFACTURE OF COKE OVENS AND WATER GAS

A striking endorsement of the views expressed in THE HEATING AND VENTILATING MAGAZINE for September, 1920, in the article on gas heating by David H. Cuyler, is given in a report published in the *Duluth (Minn.) Tribune*, to the effect that the big problem of the gas companies of the country to-day are to furnish a gas of sufficient heat units to the cubic foot at a price that will make the gas as economical a fuel for operating heating plants in the homes as coal.

According to C. W. Andrews, of the Zenith Furnace Company, of Duluth, "the tendency of the country is running more and more to the use of gas for heating. The country is working to get a basis of 450 to 500 heat units to the cubic foot as a standard and to make gas of that quality sufficiently economical to permit of its use as fuel. Even now it is possible to economically use gas as fuel in as low as zero temperature.

"The difficulty encountered is that were gas used universally for operating heaters the peak of the load would be but during the three coldest months of the year and to make sufficient gas during these months, of present commercial richness, would entail expensive equipment which would be of little or no use during the other nine months and the overhead cost would be prohibitive."

Coke oven gas is served in Duluth almost exclusively although there is a water-gas plant to meet emergencies and to relieve strain on the coke plant.

THE MANUFACTURE OF COKE OVEN GAS.

It requires 65 ovens to "distill" the coal that makes the gas. These ovens are 33 ft. long by 8½ ft. high by 18 in. wide and stand side by each on the narrow edge, each with a capacity for eight tons of coal.

The coal used in making the gas is commercially known as "gas coal" and before going to the ovens it is pulverized to prevent large pieces of slate or other foreign matter clogging the process. The coal is fed to the ovens through holes at the top by a traveling coal larry which feeds the coal automatically. In fact, it works by the clock, for there is no guesswork about the making of gas. The ovens are each filled at a certain time, the charge remains in the ovens just so many hours, throwing off gas, and is then cleaned out and a new charge goes in.

The oven is absolutely air tight after being charged with the coal, as the presence of air would prevent proper generation of gases. No ore comes in contact with the coal. Between the ovens are hollow spaces, at the base and ends of which are gas burners which provide heated by this process to a temperature the heat. When the ovens have been of 600° to 700° F. and the coal attains the same heat it begins to throw off gas. The heat continually gets more intense until it attains a temperature of 1,800.°

RICH GAS FIRST.

At the start the coal contains about 34% of gas by weight. At the end of the period the gas has been reduced to content by 2%. It is during the first eight or nine hours that the rich gas that is served to the public comes off the coal. This is passed into a huge pipe that runs lengthwise of the ovens on one side of the top. During the remainder of the 20-hour period during which the coal remains in the ovens, lean gas comes off. This is passed into another large pipe on the opposite side of the ovens and is the gas that is used for heating the ovens.

The rich gas—that containing the greatest amount of hydro-carbon, heat units—passes then to the condensing houses where by cooling, condensing and scrubbing processes the tar and ammonia by-products are removed. Thence it passes to the chemical plant where the benzol products are removed. Then it goes to the monster gas-holders, from which under a pressure of 10 lbs to the square inch it goes to the consumer through 10-in pipes to the west end of the city and 18-in pipes to the uptown district, Lakeside and Woodland. The 10 lb. pressure is sufficient to force the gas 12 or 13 miles. The requirements of Duluth are at present 2,500,000 cu. ft. each day but in the winter the use increases half a million cubic feet a day.

PROCESS OF EMPTYING OVENS.

The process of emptying the ovens is interesting. A large traveling machine with a "ramming" arm operates backward and forward in front of the ovens. When the coal has been in the oven the required period this machine is set in front of the oven, the door of the oven is automatically opened and as it opens a ram the height of the oven is pushed in and forces the hot coal out into a car waiting on the opposite side. This car runs the coal to a house at the end of the ovens where it is flooded with water, and then dumps it into bins where it is sized for use as coke.

WATER GAS MADE DIFFERENTLY.

The process of making the water gas is much different. At the plant where this is made there is first used a retort. In this, coke is heated to a white heat and then steam is forced upward through the burning coke, forming carbon monoxide or water gas. From the retort the water gas passes through a carbureter where it is enriched by mixture with a vaporized high-grade oil, known as gas oil. The gas is then reheated to "fix" the component parts, condensed and is ready for delivery.

The water gas is used largely to assist in heating the other ovens and thus permit the use of a great portion of the gas there made, for commercial purposes. In emergency, however, this water-gas plant can supply the city as it has a capacity of 3,000,000 cu. ft. per day.

If the heat unit basis of a cubic foot can be universally fixed at close to 500 units per foot it is figured that mixture of the water-gas with coal gas will make a fuel commercially economical and effective for the operation of heating plants in the homes of the city.

Progress of Movement to Establish Super-Power Stations on Atlantic Seaboard.

As a result of recent action taken by Congress, a super-power survey is being made under government auspices for the zone on the Atlantic seaboard between Boston and Washington and inland from the coast averaging 150 miles. The work is being carried out by a force which has been organized as the Super-Power Survey, with headquarters at 709 Sixth Avenue, New York.

Included in the investigations undertaken by the Super-Power Survey are an allocation of and the amount of wastes in labor, fuel and other materials as at present applied to the railways and industries in the zone, and the design of a regional system by means of which these wastes may be eliminated. An appropriation of $125,000 will defray the expense of the survey.

It is estimated that in the area between Boston and Washington and 150 miles inland there is now installed a machine capacity of 17,000,000 H. P. Of this enormous power, 10,000,000 H. P. is required to run the industries and 7,000,000 H. P. to operate the railroads.

The survey has been organized with three departments: power and transmission, railways and industries, with a division chief serving at the head of each department. There is also an advisory board of which Professor L. P. Breckenridge, of Yale University, is serving as chairman.

The division of fuel engineering of the Super-Power Survey is in charge of Professor Breckenridge, while that of technical publicity has been assigned to J. H. McGraw, president of the McGraw-Hill Company.

The significant fact is cited in connection with the Super-Power Survey that it is one of the few operating under government direction and composed entirely of engineers.

The super-power plan was first outlined in detail by W. S. Murray, a consulting engineer of New York City, who is serving as chairman of the Super-Power Survey. In brief it is proposed to serve the present power requirements in the zone described through the future development of water power and the location of super-power stations both at tidewater and at the coal mines.

It is estimated that in this manner the present power requirements could be served by one-third of the present power generating capacity. It would at the same time accomplish a saving of some 30,000,000 tons of coal annually, besides decreasing to an important extent the annual expense of maintaining the power machinery now in service.

A final report from the Survey is looked for by June 30, 1921.

The Movement in England to Abate the Smoke Nuisance.

A report by the Dean of Westminster that Westminster Abbey is in danger of decay due to atmospheric conditions has focussed the attention of the public on the Interim Report of the Departmental Committee on Smoke and Noxious Vapours Abatement which was recently published.

Among other matters the committee took up the effects produced by domestic coal smoke on buildings and came to the conclusion that the damage done to them by smoke and other atmospheric impurities was serious to the last degree. A large part of the damage, it was found, is due to sulphurous and sulphuric acids contained in the products of combustion, which was further augmented by the particles of soot in union with these acids.

In the way of remedies the report advocates the adoption of one out of several smokeless fuels, but postpones consideration of whether it will recommend any legislation with regard to domestic smoke until its final report. The committee, however, suggests that a practical means may be found through the experiments that are now being carried on by the Fuel Research Board.

Central Hot Water Supply in English Housing Scheme

In connection with one of England's housing schemes, that at Blackley, the Manchester Corporation has decided to make an interesting departure in the erection of a central hot water supply station which will serve the houses to be erected. The scheme has received the sanction of the Ministry of Health. Tenders have been invited for the erection of a hot water supply station large enough to serve 2000 houses with a day and night flow to the extent of 25 gal. daily each. The water will be of a mean temperature of 140° F

The engineering part of the scheme provides for the installation of three Lancashire boilers to be used as water heaters only and not for steam duty. Two of the boilers will be in constant use and one held in reserve. The water heaters will act as storage chambers for the hot water which will be circulated to the houses by means of an electrically-driven centrifugal pump.

It is estimated that the total saving on separate house fittings will amount to nearly $700,000 or more than sufficient to meet the estimated cost of the central system. The upkeep is estimated at about 25 cents per week per house and the total cost, it is believed, will be easily met by a charge of about 35 cents weekly on each of the tenants who will save more than that amount in fuel, besides enjoying the other benefits claimed. It is further estimated that the repairs to the central installation will be equivalent to at least a saving of $2.50 per house per year.

The Manchester Corporation has another interesting project in view for supplying hot water to a housing estate at Gorton. In this instance it is proposed to fit the necessary apparatus in the buildings, connecting with a neighboring refuse destructor, and to use the refuse as fuel for the heating.

Ninth Annual Safety Congress.

Some idea of the advance made in the cause of safety engineering is furnished in the programme for the Ninth Annual Safety Congress, held in Milwaukee, September 27-October 1. With the watchword that "safety must be incorporated into the civic and school life and organized as a community activity," a programme was prepared that filled practically the entire week and included many sectional meetings. Milwaukee is known as the birthplace of the National Safety Council and one of the features of the congress was a "no accident week" in Milwaukee extending from September 26 to October 2

Among the large number of papers presented, those in the engineering section included one on "Practical Methods of Teaching Safety to Engineering Students," by R. McA. Keown, of the Wisconsin Industrial Commission, and one on "How to Check Plans and Specifications for New Buildings and Equipment," by S. H. Kershaw, of the Hercules Powder Company. In the Chemical Section, the papers included one on "Fume and Gas Removal," by Dr. Martin Szamatolski, consulting chemist for the New Jersey Department of Labor.

New Committee on Trade Relations for Heating Contractors' Association.

President J. E. Rutzler of the Heating and Piping Contractors' National Association has appointed the following Committee on Trade Relations: Chairman, George Mehring, Chicago; (eastern zone) Horace W. Jones, Rochester, (chairman), H. S. Hall, Charlotte, N. C., and Frank W. Howard, Boston; (central zone) George Mehring, Chicago (chairman), Walter Klie, Cleveland, and V. L. Sheldon, St. Louis; (western zone) George L. Bradbury, Denver (chairman), Archie E. Ayers, Seattle, and Jesse Coogan, Salt Lake City.

Metal Worker and Sheet Metal Combined.

Announcement has been made of the combination of the *Metal Worker*, one of the oldest trade weeklies serving the plumbing and sheet metal trades, and *Sheet Metal*, a monthly journal devoted exclusively to the sheet-metal industry. The announcement states that the ownership of the *Metal Worker* has passed to Edwin A. Scott, formerly its managing editor and for the past four years publisher of *Sheet Metal*. The Edwin A. Scott Publishing Co., Inc., has been organized to carry on the work of these two journals. Mr. Scott is at the head of the new enterprise and associated with him are the editors and editorial staff of the *Metal Worker* and the majority of the former business and office staffs of both journals.

As a result of the merger the sheet-metal departments of the two journals are being carried on in a new journal know as *Sheet Metal Worker*, while the plumbing and heating sections of the *Metal Worker* will be published as a separate journal, with the title of *Plumber and Steam Fitter*. The two journals are published on alternate weeks.

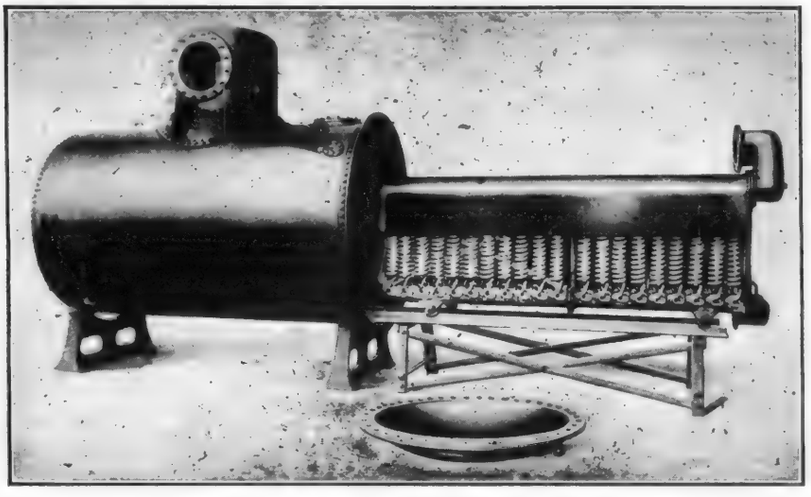
Organization of Engineering Business Exchange.

To meet the condition where an engineering business may be sold at a sacrifice or has become unprofitable because its owner, who wished to sell, had no way of finding a man able and willing to pay a fair price for the property, a new organization has been formed under the title of The Engineering Business Exchange. At the head of the new company is Charles Whiting Baker, late editor-in-chief of *Engineering News* and consulting editor of *Engineering News-Record*. The exchange is organized to conduct the purchase and sale of engineering and technical business properties, manufacturing, constructing, selling or professional. Quarters have been taken in the Hudson Terminal Building, 30 Church Street, Room 347.

The Engineering Business Exchange, it is pointed out, will serve not only the owner of a business who desires to sell outright because of age, illness, or of other demands in his time, but also the owner who seeks to dispose of a part interest to secure additional capital or to bring into the management men of the ability and energy to develop the business better than he himself would. The exchange will serve as the confidential representative of those who place their business in its hands, thus avoiding publication of the fact that a business is for sale, which might seriously injure its credit and its trade. The fact that Charles Whiting Balker is to act as managing director is an assurance that the exchange will be conducted on satisfactory lines. His long service as editor of *Engineering News*, from 1895 to 1917, as well as his subsequent activities as consulting editor of *Engineering News-Record* have made him a nationally-known figure in engineering circles.

Progress of Boiler Feed-Water Purification by Evaporation.

It is, of course, often necessary to purify boiler feed-water for steam purposes. Sea water, for instance, cannot safely be used in boilers, so that every ocean-going ship carries apparatus which purifies the salt water. This necessity has led to the development of evaporators. The type of apparatus at first used was extremely crude, but constant improvement has been made in the art, one of the latest types being the Reilly evaporator, manufactured by the Griscom-Russell Co., New York. It is of the submerged type and not only provides a constant pure supply of boiler feed-water, but also serves to furnish water for drinking purposes. The difficulty with the earlier types of evaporators was due to the scaling of the evaporating surfaces, but it is stated that this new submerged type is actually self-scaling.



REILLY BOILER FEED-WATER EVAPORATOR.

The development of feed-water purification by exaporation in the marine field has extended over more than 50 years, but it has not been applied to any extent in stationary power plant practice until about five years ago. This purification is accomplished in a similar manner to the established ship-board procedure, with the exception that the refinements of operation are even greater, and plants are so arranged that practically all of the heat used in the evaporation of the water by the use of steam is returned to the system.

In actual operation, high-pressure steam is supplied to the coils of the evaporator and, condensing in these coils, evaporates the body of water in the shell surrounding the coils. This purified vapor is in turn condensed in a condenser and is then ready for boiler feed. This is descriptive only of the basic features of the apparatus. It is the idea of utilizing the hot-well water as the condensing water, and other features, which are designed to make the system a valuable means of purification.

New Edition of Hoffman's Handbook.

HOFFMAN'S "HANDBOOK FOR HEATING AND VENTILATING ENGINEERS, by Professor James D. Hoffman, has appeared in a new edition, the fourth, with the text entirely rewritten and reset in every part; 87 pages have been added. Of this increase 17 pages have been added to the discussions on heat applications, combustion of fuels and analysis of flue gases. The chapters on steam and water heating have been lengthened by about 40%. Chapter XIII. has four pages of extensions to the calculations of steam and water heating mains. The remainder of the book is as it was, with the addition of "Suggestions to School Districts," "Suggested Piping Connections for Vacuum System Details," and several new tables on pipe sizes for steam and water heating service. The book is supplemented by a separate publication containing "A Course of Instruction for Technical Schools with Questions, Problems and References," to be used in connection with the Handbook. The price of the book remains the same, $4.50. It is published by the McGraw-Hill Book Co., 239 West 29th Street, or may be had from the book department of THE HEATING AND VENTILATING MAGAZINE. Size 4½ x 6¾ in. Pp. 478.

Catalogues for Rough Usage.

Catalogues issued by manufacturers of machinery, heating supplies, etc., are frequently handled and soiled by mechanics whose hands are covered with grime and dirt. For this reason a cleanable cover material is offered by E. I. Du Pont de Nemours & Co., Arlington, N. J. in the form of a pyroxylin-coated book cover. The art of stamping and pasting the edges of this material has recently been perfected. With its use it is possible for any manufacturer or contractor to have a catalogue cover from which grim spots can be washed with soap and water without injuring it, for the goods are waterproof. The leather substitute, it is stated, is very durable and will generally remain sound throughout the life of the catalogue.

New Publications.

ENGINEERING INDEX for 1919 has been published by the American Society of Mechanical Engineers, New York. It contains over 500 pages and references to over 12,000 separate articles. Price, $4,00. May be had also through the book department of THE HEATING AND VENTILATING MAGAZINE.

HANDBOOK OF ARCHITECTURAL PRACTICE has been published by the American Institute of Architects. Several years' effort have been expended in its preparation and it is stated that the text embraces an examination and study of the systems in use in the best offices in the United States. Part I is devoted to the architect and the owner. Part II deals with the architect's office, and Part III, with surveys, preliminary studies, etc. The letting of contracts is taken up in Part IV in which details are given of the stipulated sum method, the cost-plus-fee method and the quantity system. Part V is devoted to the execution of the work and Part VI to the architect and the law. The complete text of all the documents published by the American Institute of Architects is contained in Part VII. These include the institute's standard contract forms and are a valuable compilation in themselves. Price $5.00, postpaid. May be had through the institute or from the book department of THE HEATING AND VENTILATING MAGAZINE.

SOURCES OF OUR EXPORTS, being a graphic presentation of the national service of foreign trade showing how and why every man, woman and child in the United States is concerned in the steadfast maintenance of our international commerce, has been published by the National Foreign Trade Council, Hanover Square, New York. It is an impressive document, illustrated with maps and charts, the text being prepared by men who are leaders in their respective fields. In commenting on the publication, the secretary of the Foreign Trade Council, O. K. Davis, states that it is not generally known that foreign trade now forms about 17% of our total commerce, or that our productive capacity in many lines now exceeds domestic requirements. Naturally, very few among the farmers and factory workers of the country realize that the products of their hands are sent abroad, and that their continued prosperity and employment, in many cases, depend on the maintenance or development of foreign trade. Size 10 x 15 in. Pp. 40.

THE PSYCHRO-BOOK is the title given to a unique set of data, in pocket-book form, published by the E. V. Hill Co., 117 North Dearborn St., Chicago, Ill.,

aerologists. The pocket book is made of leather, 6 x 4 in. and is less than ½-in. thick. It contains a full-size psychrometric chart with all tabular data on the proper margins, a comfort chart giving the desirable wet-bulb temperature and the corresponding air motion for persons at rest, doing light work, moderate and heavy work, under both winter and summer conditions; also a 5-in Tycos standard nitrogen-filled thermometer and a simple attachment whereby the wet-bulb temperature can be easily and accurately determined. In addition the case contains a note book, a card case, and a bill book. It is described as the working tool of the ventilating and air conditioning engineer, with the difficulties, mysteries and inaccuracies removed. The Psychro-book sells at $7.50 net.

How To Make and Use Graphic Charts is the title of the second edition of a book by Allen C. Haskell. All kinds of charts are discussed and explained including organization and management work, cost and cost analysis, scheduling and progress, operating characteristics, results of tests and experiments, statistical trends and predictions, computation, designing and estimating. The book describes the methods of using rectilinear charts, logarithmic and semi-logarithmic charts, isometric and trilinear charts and gives illustrations which show not only how others have utilized such charts, but also suggest many new uses. Size 6 x 9 in. Pp. 545, with over 500 ills. Published by the Codex Book Co. Inc., or may be had through the book department of The Heating and Ventilating Magazine.

Financial Engineering, a text-book for consulting, managing and designing engineers, by O. B. Goldman, consulting engineer, professor of heat engineering in the Oregon State Agricultural College, has been published by John Wiley & Sons, New York. The book is intended primarily for the practicing engineer. It extends engineering over business and administrative problems, teaching how to translate engineering factors into dollars and cents. All mathematical deductions are worked out in detail. Size 6 x 9 in. Pp. X + 271. 54 figs. Cloth, $3.50 net.

The Growth of the Powers Regulator Company.

The completion of a new factory building by the Powers Regulator Company and the scale on which it has been built, call attention to the growth of this company since the commencement of its operations in 1890. The story is well told by W. P. Powers, founder and president. "At this time," says Mr. Powers, in an article prepared by him for his company's publication, "Tuesday Talks," "when we are settling into our new and up-to-date factory, I am inclined to take a retrospective view of the road over which we have passed during the thirty years that have elapsed since we commenced operations in Chicago in 1890. My thoughts go back to the little room, 12 x 16 ft. square, from which were turned out the first house regulators made in Chicago. It thus appears that the first and up to the present time the last of our work has been done in the same building from which we have just moved, although we have occupied several other quarters in the meantime.

W. P. POWERS
Founder and President of Powers Regulator Company.

"This limited space was soon outgrown and we moved to 90 Illinois Street where we had about 800 sq. ft. in the machine shop of McCrary & Son, where we put in our first meager mechanical equipment and began to do our own machine work.

"This space soon proved inadequate and the World's Fair in 1893 found us occupying about 4000 sq. ft. on the third floor of the same building with an office on the floor below, where we engaged our first stenographer. Soon after we moved our office to 36 Dearborn Street and began operations in school buildings, using the round thermostat, not as yet having seen our way to supplement it with air pressure. The first thermostat controlling with air pressure was brought out in 1895.

"A somewhat serious fire (the second one in this building) originating in the floor above us, caused us to move to the Bradley Building on the west side, on Fulton Street, where we occupied about 6000 sq. ft. of floor space; so each of these changes showed a healthy growth.

"About 15 years ago we purchased of the Union Wire Mattress Co., the building where we made our humble beginning with the floor space of less than 200 sq. ft., having developed the business by that time to a point that required about 8000 sq. ft. which we used on the second floor, renting the rest of the building to various tenants. As the business grew year by year, we spread over the other floors, crowding out the tenants one after another, until when we left, we were occupying about 26,000 sq. ft. of space.

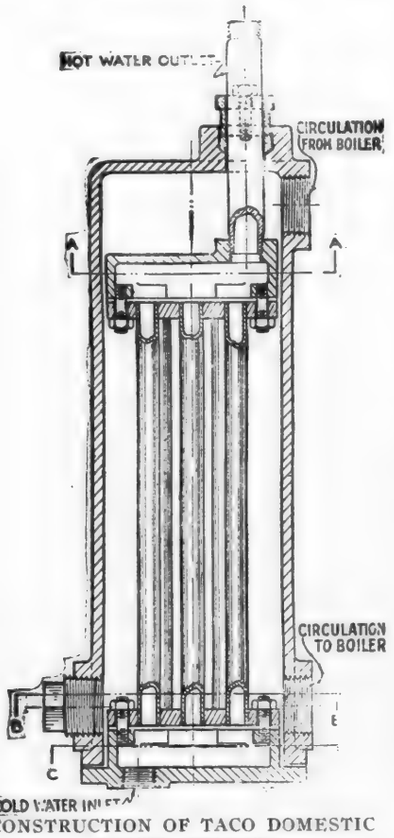
"During the last seven or eight years our line of specialties has been developed, requiring more and more room for which we are now well provided, having a space of about 40,000 sq. ft., all in a fireproof building where we will have no haunting fears of burning and where we will have what we have long wished for, the office and factory under one roof."

Mr. Powers was recently presented with a silver pitcher by the company's shopmen who have been with the company for ten years or more. The presentation speech was made by L. T. Bowman, who came with the company as superintendent 27 years ago, and was lately in charge of the new factory construction and equipment. During his stay "in the East" (Mr. Power's home is in Los Angeles, Cal.) he attended the commencement exercises at the University of Wisconsin, accompanied by Mrs. Powers. Mr. Powers was there especially for his class reunion, being one of the two surviving members of the Class of '60. He also represented the Los Angeles Alumni Association of his Alma Mater on that occasion.

NEW PLANT OF POWERS REGULATOR COMPANY IN CHICAGO.

Trade Literature.

HOT WATER COMFORTS IN THE HOME is the attractive title of a catalogue issued by the Thermal Appliance Co., New York, devoted to the Taco water heater. This device is an independent unit, connected onto the outside of the boiler. It is built with a cast-iron cylinder, containing a series of brass tubes built straight, of sufficient size to insure free circulation of the water at all times. The water from the house-heating boiler circulates through the Taco



CONSTRUCTION OF TACO DOMESTIC WATER HEATER.

heater on the same principle that water circulates through a water heating system. The heater may be installed in either a vertical or horizontal position, as conditions may require, below the water-line. It can be readily installed, it is stated, without interfering with any part of the heating plant. It is attached to tapped openings which are now being provided by most of the boiler manufacturers. It is made in three sizes, with capacities ranging from 30-40 gal. to 80-100 gal.

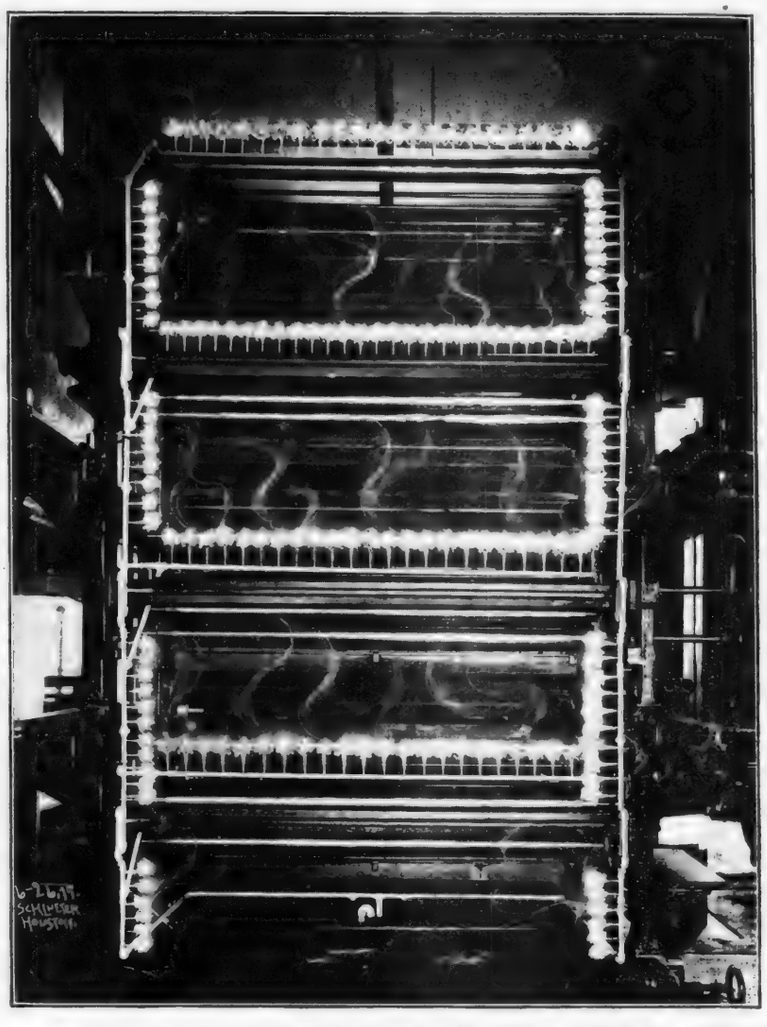
STANDARD STEAM VAPORIZER, for application to printing presses to overcome static electricty, is brought to the attention of the trade in a catalogue issued by the manufacture, J. B. Collins, Houston, Texas. With the use of this vaporizer, it is stated, static electricity is entirely eliminated. In addition, the slight dampening of the paper causes the ink to print more clearly and conserves about 40% of it in operation.

The system contemplates the use of steam from a low-pressure system of heating or from a high-pressure line, controlled by reducing valves, distributed through a series of pipes, the steam pressure not to exceed 1 lb. The decks of the presses are regulated by controlling valves which are so placed that control of steam distribution can be had at any point on the press where the vaporizer is located, or, should all of the rolls be in operation at the same time, steam can be distributed over each roll. This operation is such as to slightly dampen these rolls of paper as they pass over the steel rolls in the press, thus eliminating friction and disposing of the static electric current and the resultant breaks in the sheet which are brought about due to this friction. Included in the catalogue are mechanical data giving the boiler requirements for the different sizes, which run from a boiler equaling 8 H. P. for a 2-deck vaporizer to a boiler equaling 18 H. P. for a 6-deck vaporizer. Where independent boilers are used in connection with the vaporizers the maximum steam pressures will be 10 lbs. for Sizes 2, 3 and 4, and 15 lbs. for Sizes 5 and 6. The water of condensation is discharged into a sewer connection or dry well underneath or adjoining the presses. A number of testimonials are presented in the catalogue showing the effectiveness of these vaporizers in service. Size 8½ x 10¾ in. Pp. 12.

IMPERIAL SUPER-SMOKELESS BOILERS, described as the original single-grate smokeless boiler for all fuels, are presented in a handsomely-compiled catalogue issued by the Utica Heater Co., Utica, N. Y. The supersmokeless principle, it is stated, was first applied to bituminous coal and was found to be successful in burning even the lowest grades smokelessly, with remarkable economy and with the minimum of attention. It was also found that with slight changes in the method of operation, it attains high efficiency in burning anthracite coal.

CLIMATE A LA CARTE is the title of a recent circular devoted to Sturtevant apparatus and FL engineering service, rendered by the B. F. Sturtevant Co., Hyde Park, Boston, Mass., and the W. L. Fleisher Co., Inc., 31 Union Square, New York. "Pick out the ideal day for your product," declares the circular, "and we will guarantee to reproduce it 365 times in the year." The illustrations which accompany the circular show a number of interesting installations, notably that in the plant of Smith Bros. (cough drops), the equipment for a candy baking room, a cooling system for a butterine factory and an air conditioning installation for a bakery.

PROOF that the superior return-line valve of to-day is one with a by-pass



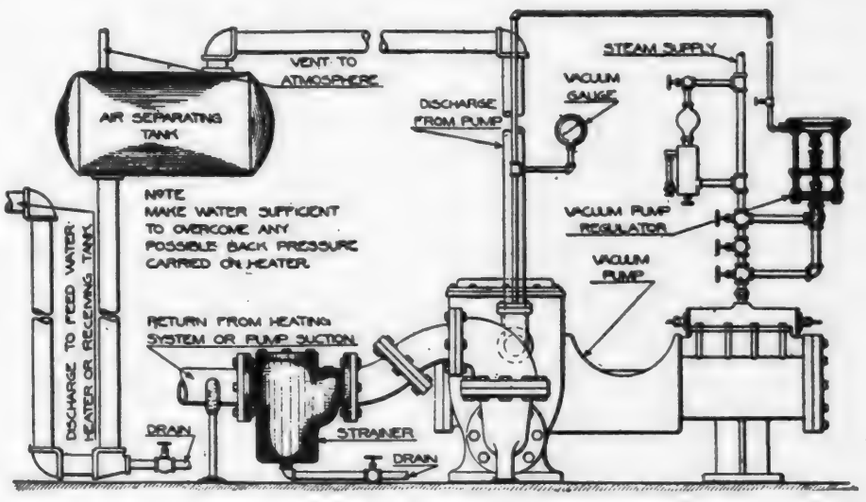
STEAM VAPORIZER APPLIED TO PRINTING PRESS TO OVERCOME STATIC ELECTRICITY.

and clean-out feature is offered in a circular on the Monash thermostatic return-line radiator valve, issued by the Monash-Younker Co., Chicago, Ill. The circular cites the experience of an engineer for a Detroit corporation who, after a trial order, installed more than 4,000 of these valves in 21 factory buildings. The circular includes a notable list of users of the Monash valve.

MONASH THERMOSTATIC RETURN LINE RADIATOR VALVE.

This valve, which is the invention of the late James H. Martin, Jr., has been used successfully in large plants due to its by-pass and cleanout feature, as well as that of the diaphragm not being attached to the body or cover of the valve. Notable installations are cited by the manufacturers, including those for the Fisher Body Corporation of Detroit (5,000 valves in 21 factory buildings), and the Continental and Commercial National Bank Building (3,300 valves).

McAlear Vacuum System of Heating and McAlear Vapor Heat are brought to the attention of the trade in new Catalogues (Bulletins A and B), issued by the McAlear Mfg. Co., Chicago, Ill. Bulletin A presents, in handy form, the various devices used with the McAlear vacuum heating system, including different types of radiator traps, Vento coil steam traps, air traps, packless radiator valves, vacuum-vapor pressure regulating valves, suction strainers and pump governors. Each type is accompanied by the necessary data. Bulletin B, on McAlear vapor heat, tells in detail how to figure and install the McAlear vapor heating system, including rules for computing boiler size for direct, direct-indirect and indirect radiation, rule for computing radiation, pipe sizes for various amounts of direct radiation and radiator supply and return



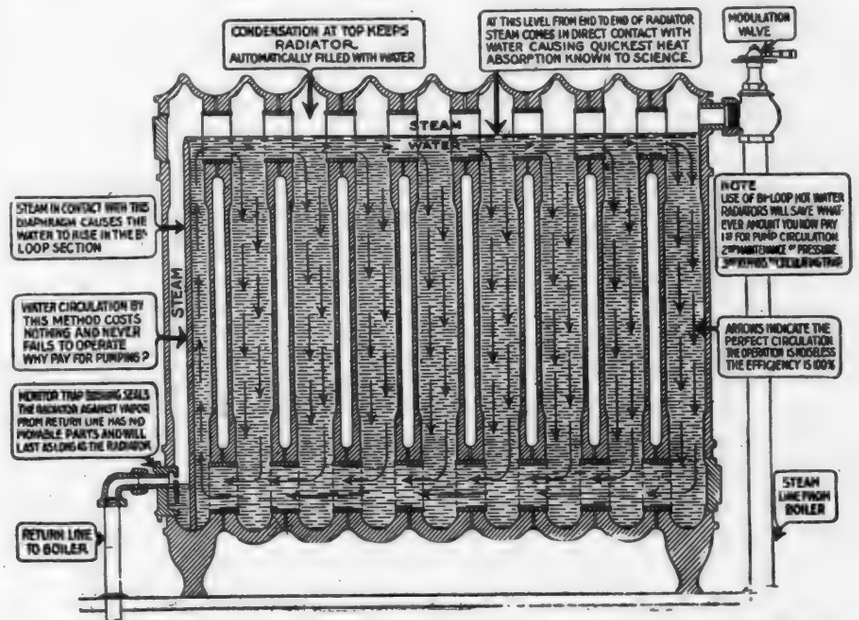
TYPICAL INSTALLATION OF McLEAR HEATING SPECIALTIES.

connections. The illustrations include a number of typical installations. Size of each bulletin 6 x 9 in. Pp. 16, each.

"Good-Bye Heating Troubles" is the title of a new catalogue devoted to the Monitor Bi-Loop modulated water heating system, manufactured by the Monitor Bi-Loop Radiator Co., Lancaster, Pa. The radiators used with this system are so constructed that when ready for operation they are 95% filled with water, thus leaving a space across the top and down one-half of the bi-loop section empty of water. The steam coming in direct contact with water at the top of the radiator causes quick heat absorption, while the steam coming in contact with the diaphragm or partition in the bi-loop section, causes the water to rise, thereby starting a circulation which affects the entire radiator. In this system the water is not returned to the boiler to be reheated, but circulates within the radiator. Among other points mentioned in favor of this method is that it reduces air removal trouble to a minimum as nearly all of the space within each radiator is filled with water and the passage of air is directly across the top and down the bi-loop section. The catalogue also features the Monitor U-tube boiler which is described as the most powerful steam or water heating boiler made. Size 8 x 10 in. Pp. 32.

Sometown is the title of a clever storyette sent out by the Clay Products Association, Chicago, Ill., and describing, with much realism, the typical American town before it has awakened to the need of adequate drainage systems and the way the idea developed and was "put across" in "Sometown." It makes interesting reading.

Buffalo Fan System of Heating, Ventilating and Humidifying as developed by the Buffalo Forge Co., Buffalo, N. Y., are presented in an elaborate catalogue (No. 700), supplemented by a wealth of engineering data. In


CONDENSATION AT TOP KEEPS RADIATOR AUTOMATICALLY FILLED WITH WATER
AT THIS LEVEL FROM END TO END OF RADIATOR STEAM COMES IN DIRECT CONTACT WITH WATER CAUSING QUICKEST HEAT ABSORPTION KNOWN TO SCIENCE.
MODULATION VALVE
STEAM
WATER
STEAM IN CONTACT WITH THIS DIAPHRAGM CAUSES THE WATER TO RISE IN THE BI-LOOP SECTION
STEAM
WATER CIRCULATION BY THIS METHOD COSTS NOTHING AND NEVER FAILS TO OPERATE WHY PAY FOR PUMPING?
ARROWS INDICATE THE PERFECT CIRCULATION THE OPERATION IS NOISELESS THE EFFICIENCY IS 100%
STEAM LINE FROM BOILER
RETURN LINE TO BOILER

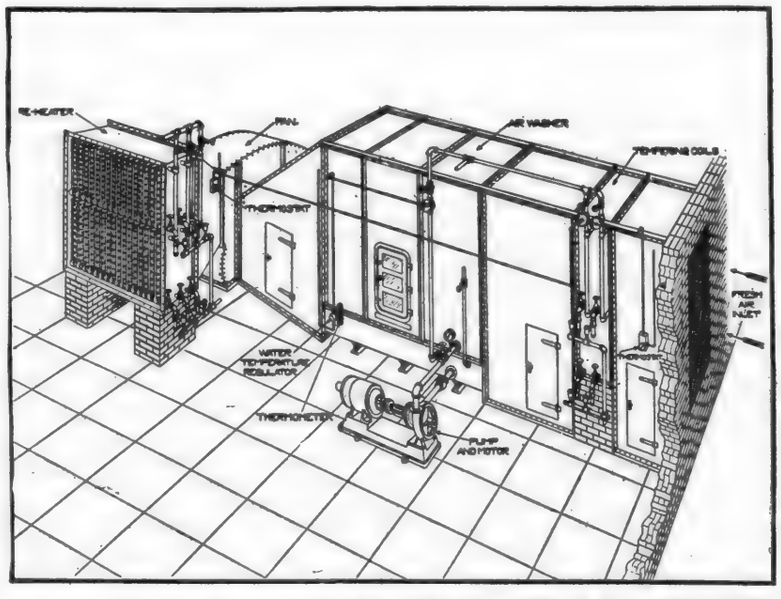
CIRCULATION OF WATER AND STEAM IN THE MONITOR BI-LOOP WATER RADIATOR.

the foreword it is emphasized that the Buffalo Forge Company has always taken the stand that engineering data and developments should not be hoarded as hidden treasures, but should be made available for the use and edification of the engineering profession in general. In this volume stress is laid on the principles underlying the various steps in the determination of suitable apparatus to meet a wide variety of conditions. Part 1 is devoted to public buildings with references to the Hill synthetic air chart and with reproductions of the well-known Carrier psychrometric charts. Part 2 comprises industrial plants and takes up in detail the problems involved in such work. Part 3 takes up the Buffalo apparatus, with notes on the selection of fans, air washers, feed-pumps and receivers, heaters and engines. Part 4 presents in condensed form the valuable engineering data which appeared originally in the company's publication, "Fan Engineering." The catalogue concludes with numerous tables, both general and applying particularly to Buffalo apparatus, together with an index. Size 8½ x 11 in. Pp 116.

WEBSTER AIR WASHERS for schoolhouse ventilation are shown in a readable circular issued by the Atmospheric Conditioning Corporation, Lafayette Building, Philadelphia, Pa. After discussing the general need of air washers, both for humidifying and cleansing purposes, the circular presents the basic elements of the Webster air washer, accompanied by views of the apparatus itself and numerous details. Attention is also directed to the Webster system of humidity control by which the wet-bulb temperature of the air may be kept at a predetermined point. A list of some 100 installations are cited, showing the wide extent to which the Webster air washers are used.

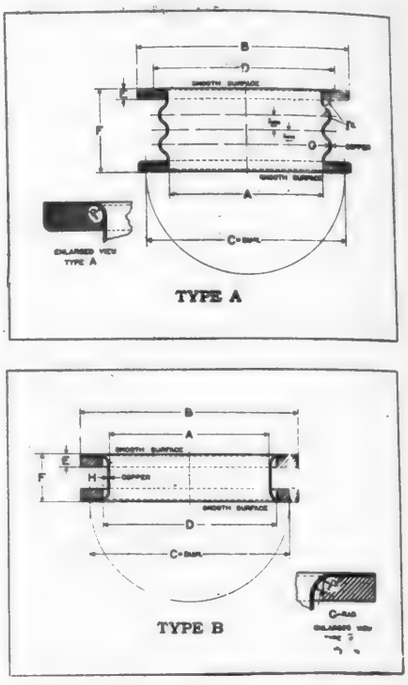
LEHIGH FANS, BLOWERS, AIR WASHERS, ROOF FAN VENTILATORS AND DUST COLLECTORS, manufactured by Hersh & Bro., Allentown, Pa., embracing the appliances formerly produced under the trade name of "Bicalky" are discussed in a catalogue that meets every requirement of the fan engineer. Both in arrangement and in the data presented it is apparent that an effort has been made to render the catalogue of the greatest usefulness, and this feature will no doubt be widely appreciated. The detailed data cover Lehigh multiblade fans, type M; Lehigh steel-plate fans, Type S; Lehigh Standard planing mill exhaust fans, Type E; Lehigh slow-speed planing mill exhaust fan, Type F; Lehigh pulley-driven disc fans, Type D; Lehigh pulley-driven propeller fans, Type H; also Lehigh air washers, Type A, and the company's other products, such as Bicalky roof fan ventilators, mushroom ventilators and dust collectors. Size 8½ x 11 in. Pp. 64.

WEBSTER CATALOGUE BULLETINS, embracing the various bulletins of Warren Webster & Co., Camden, N. J. and including the company's extensive line of products, have been issued in loose-leaf binder form and constitute an impressive volume of trade literature. Among the apparatus featured in the various bulletins are Webster feed-water heaters what they do and where they are doing it; Webster feed-water heaters, rectangular cast-iron types; Webster steam separators; Webster oil separators; Webster expansion joints; Webster Hy-Lo vacuum control system; Webster sylphon trap; Webster No. 7 trap; and Webster vacuum system of steam heating. The latter contains many notes, accompanied by detail views, that will be appreciated by the designing engineer. All of the bulletins, both in composition and letter-press, conform to the high standard which the company has always set for itself in its printed matter. Size 8 x 11 in.



WEBSTER SYSTEM OF HUMIDITY CONTROL APPLIED TO APPARATUS HAVING REHEATER BEYOND THE FAN.

G-R EXPANSION JOINT, for low-pressure work, is an interesting product of the Griscom-Russell Co., New York, featured in a recently-issued circular (Bulletin No. 1010). It is made in two types, Type A having flanges of cast-iron, the expansion metal being corrugated copper with two corrugations. It is adaptable to a working pressure of 20 lbs. Type B expansion joint is made of cast-steel. The copper expansion metal has no corrugations. The working pressure is also 20 lbs. per square inch. Full details regarding dimensions of each type are included in the bulletin, which is illustrated with photographs and detailed drawings. A list is also given of the other products of the Griscom-Russell Co., including the Reilly and other types of water heaters, oil heaters, evaporators and distillers; Goubert condenser, multiwhirl cooler, Stratton air, steam, and oil separators; Bundy oil separator, multiscreen feed-water filter, G-R strainer and Reilly aerating filter. Size 6 x 9 in. Pp. 8 (punched for binding).



TYPES OF G-R EXPANSION JOINTS.

NIAGARA CONODIAL FANS, manufactured by the Buffalo Forge Co., Buffalo, N. Y. a companion catalogue to No. 700, mentioned in a preceding paragraph, is devoted exclusively to the Type N Niagara Conoidal units which are designed to operate at speeds met with in ordinary heating and ventilating practice. As is well known it is a fan of the multiblade type, having blades of single curvature, conforming to the surface of a cone. After discussing the principle of the fan's design, the catalogue goes into the details of construction, followed by numerous data tables covering both construction and performance. Size 8½ x 11 in. (adopted by the company as standard). Pp. 52.

VALVE WORLD for September, 1920, the monthly periodical of Crane Co., Chicago, contains, among other things, an article by George H. Bottom on "Progress in Standardization of Screw Threads." Another interesting article is contributed by H. J. Bartlett, of the company's Specialty Department on "The Manufacture of Paper."

TAG-ROESCH TIME-TEMPERATURE AND TIME-TEMPERATURE-CONDENSATION CONTROLLERS are new devices developed by the C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., and described in a newly-issued catalogue (No. 490). These controllers have been designed for industrial applications where predetermined conditions of temperature may be automatically produced within a definite period of time. The controller and its component parts are intended to control the time and temperature in exact accordance with a predetermined plan of action, and in proper sequence to automatically produce the desired results. A number of representative cam applications are illustrated, such as those for lumber dry kilns, milk sterilizing, etc. Full information is contained in the catalogue for selecting the proper tubes and bulb stems, while other data cover such items as diaphragm-motors, compressed air requirements, and compressors. Size 8 x 11 in. Pp. 32.

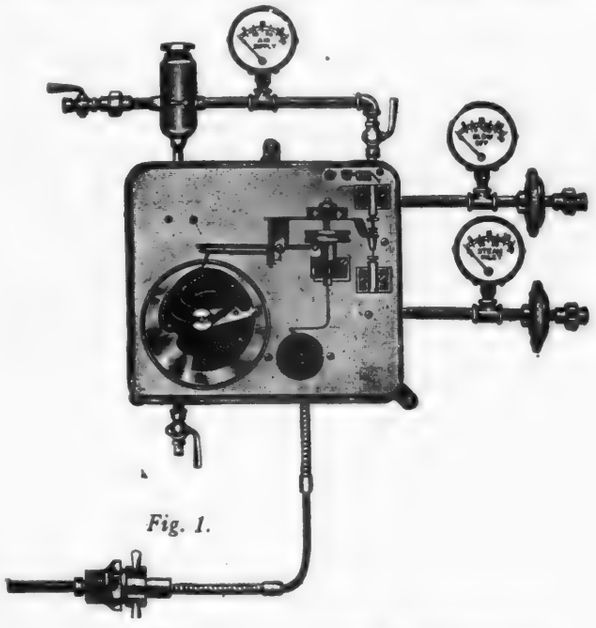
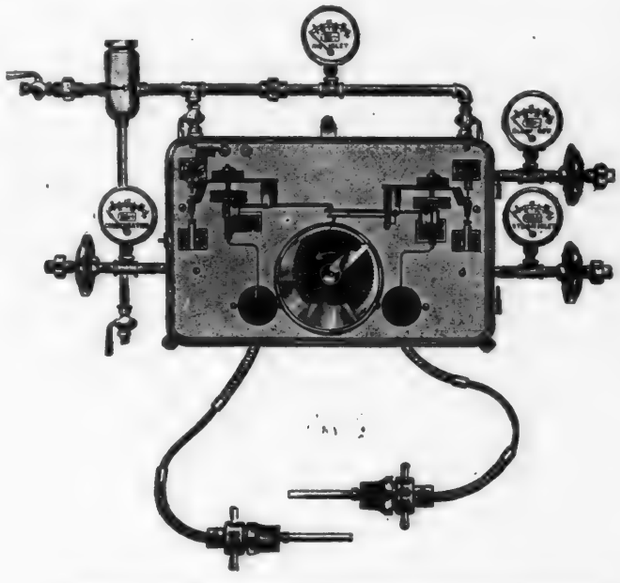


Fig. 1.

TAG-ROESCH TIME-TEMPERATURE CONTROLLER.



TAG-ROESCH TIME-TEMPERATURE-CONDENSATION CONTROLLER.

RAY'S ROTARY CRUDE OIL BURNER, for low and high-pressure boilers, from 10 to 300 H. P. are featured in circular matter issued by the W. S. Ray Mfg. Co., Inc., San Francisco, Cal. That this device has long since passed through the experimental stage is evidenced by the fact that over 3,000 burners are now in successful use. They are designed to burn 14 gravity fuel or lighter oils without soot, carbon, smoke, dirt or noise and are described as high-temperature burners which will not destroy the range or furnace; they are guaranteed for one year. Among the advantages mentioned for this burner are its enclosed, oil-cooled and bearingless motor, with its split field; its lubrication at only one point, splash lubrication to bearings, hollow shaft and large ball bearings, with 300% overload rating. For house-heating work, fuel-oil as low as 14 gravity, it is stated, can be burned successfully, with a saving of approximately one-half over coal at $8.00 per ton and fuel-oil at $1.50 per barrel of 42 gal., on the basis that coal has 14,000 B. T. U. per pound as against oil with 18,500 B. T. U. per pound, and assuming that the coal is perfectly fired.

RF ADJUSTABLE SPEED MOTORS of the latest design, arranged for direct current and rated from 2-3 to 50 intermittent horse-power, are described in a second edition of Bulletin 41021 A, superseding Bulletin 41021, issued by the General Electric Co., Schenectady, N. Y. In these motors a compensation winding practically eliminates flux distortion losses, which may amount to from 5% to 10% in the conventional commutating pole adjustable-speed motor. The motor, it is stated, is particularly suitable for pipe-threading and similar service, or for driving any machine repeating its cycle of operation.

Housing Legislation Enacted by New York Legislature.

While the recent special session of the New York Legislature, called on account of the impending housing crisis, adjourned without satisfying the hopes of many, the legislature, nevertheless, took important action in exempting from taxes for a period of ten years, all new dwellings, and providing for a further investigation of the alleged combination to maintain the high prices of building materials.

Capacities of International Economy Round Boilers.

The usefulness of the round type of boiler for smaller installations is well illustrated in the line manufactured by the International Heater Co., Utica, N. Y. This line comprises no less than 21 sizes, with capacities ranging from 350 to 1475 sq. ft. of direct steam radiation. The manufacturers state that the high evaporative power and large coal-carrying capacity of these boilers allow them to be rated on a conservative basis for 8, 10 and 12-hour firing periods.

INTERNATIONAL ECONOMY ROUND BOILER.

Meeting of Federated American Engineering Societies.

The first meeting of the American Engineering Council of the Federated American Engineering Societies is to be held in Washington, D. C., November 18-20. Headquarters will be at the New Willard Hotel.

A form of construction which is attracting considerable attention on the Pacific coast is described as a "dough-

nut" house. It involves the use of hollow tile. The hole in the tiling is filled with concrete after the tiles are all in place, making the whole structure rigid. Plaster is put on without laths.

Bureau of Mines to Experiment with Lignites.

Efforts to make the lignite or brown coals of Texas, North Dakota, and other western states so serviceable to that part of the country that it will be unnecessary in the future to ship in other coals at great expense are to be inaugurated immediately by the Bureau of Mines, at New Salem, North Dakota, in co-operation with a company there.

Immense quantities of these lignites, constituting one-third of the fuel resources of the nation, are available in these States, but have been little used because of the great amount of moisture in them, their tendency to disintegrate when dry and their liability to spontaneous combustion. In fact, the difficulties have been so great in burning the lignite that the people have preferred to buy their coal in Illinois, Indiana, West Virginia, Kentucky, and Pennsylvania, bringing into their localities several million tons of coal that had been hauled an average of 1,000 miles and at a cost of nearly $5,000,000 in freights. The Bureau of Mines proposes to carbonize and briquet this raw lignite and develop a smokeless domestic fuel that will do away with the importation of domestic coal into this section of the country. By heating the lignite sufficiently to drive off the moisture and a part of the gases, a char is obtained which in heating value closely approximates anthracite coal. The briquetting of this makes a very satisfactory household fuel.

An appropriation of $100,000 was made by Congress a year ago for this purpose and the Bureau of Mines has, after a careful survey of the entire field, in which a number of the cities in these States have offered their facilities, selected New Salem as the place best fitted for the investigations, which will begin at once.

It is claimed in this process of carbonizing the lignite and making briquets out of it that not only is a superior domestic fuel created, but that valuable by-products are made, such as enormous quantities of gas to be used for fuel or power purposes, and a great amount of oils and tars.

O. P. Hood, chief mechanical engineer of the Bureau of Mines, under whose auspices the investigations will be made, said: "It is believed that under present conditions a successful plant can be assembled. The government fund will be used in providing those parts of the plant that are unusual and special and in making a thorough investigation of the process and of the quantities produced so that a report for public use will be available for those desiring to enter this field."

The government plant at New Salem will be under S. M. Darling, fuel engineer of the bureau, who has specialized on lignite problems for the Saskatchewan government.

Peat Blocks for Fuel in the Baltic States.

So serious is the fuel situation in the Baltic States that the government of Latvia is considering the issuing of wood and peat cards in much the same manner as the other governments of Europe issued, during the war, bread, sugar and milk cards.

As a result of this threatened fuel shortage the Latvian government has turned its attention to the harvesting of the vast peat deposits which are to be found about Riga, in the country around Kovno, and in other sections. Already the peat market in Riga is one of the interesting spots in the city, while the gathering and preparing of it is furnishing employment for scores of men and women. To prevent profiteering, the Government will place a fixed price upon peat bricks.

In this attempt to educate the people in the use of peat, the various stations of the American Red Cross are setting an example by using it for cooking purposes. At the same time Red Cross officers are conducting experiments with a combination of peat and other materials in an endeavor to find a fuel which may be used in the manufacturing plants about Riga and thereby reduce the drain on the wood supply of the country.

Death of W. L. Bronaugh.

We are glad to be able to supplement the notice, published in last month's issue, of the death of W. L. Bronaugh, of Chicago, with the following additional details, which appear in the *Journal* of the heating engineers' society:

"Mr. Bronaugh was born in Lexington, Ky., October 1, 1877. He graduated from the State College of Kentucky, receiving his bachelor degree of mechanical engineering in the year 1899, and was past-president of the General Alumni Association of Kentucky and of the Chicago-Kentucky Alumni Club. He was also a member of the Sigma Chi Fraternity and of the Lamp and Cross honorary senior society. He was a leader in the movement to obtain alumni representation on the Board of Trustees of the University of Kentucky, as a result of which, the alumni nominated three candidates every two years from which the Governor, ex-officio chairman of the board, appoints one to be a trustee. Mr. Bronaugh was nominated as one of the representatives on the Board of Trustees last December."

Deaths.

JOHN D. GREEN, vice-president and works manager of Rathbone, Sard & Co., Aurora, Ill., stove manufactures, and a former president of the National Warm Air Heating and Ventilating Association, died at a hospital in Aurora, August 15, after a week's illness. His death was caused by kidney trouble. Mr. Green was instrumental in the formation of the Midland Club, an organization of warm-air furnace manufacturers, and had served many terms as president of the club. He was one of the most active supporters of the movement for research work in furnace heating at the University of Illinois. He was associated with the stove and furnace industry throughout his business life of more that 40 years.

Current Heating and Ventilating Literature.

Under this heading is published each month an index of the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the article mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

AIR IN STEAM, EFFECT ON HEAT TRANSMISSION.

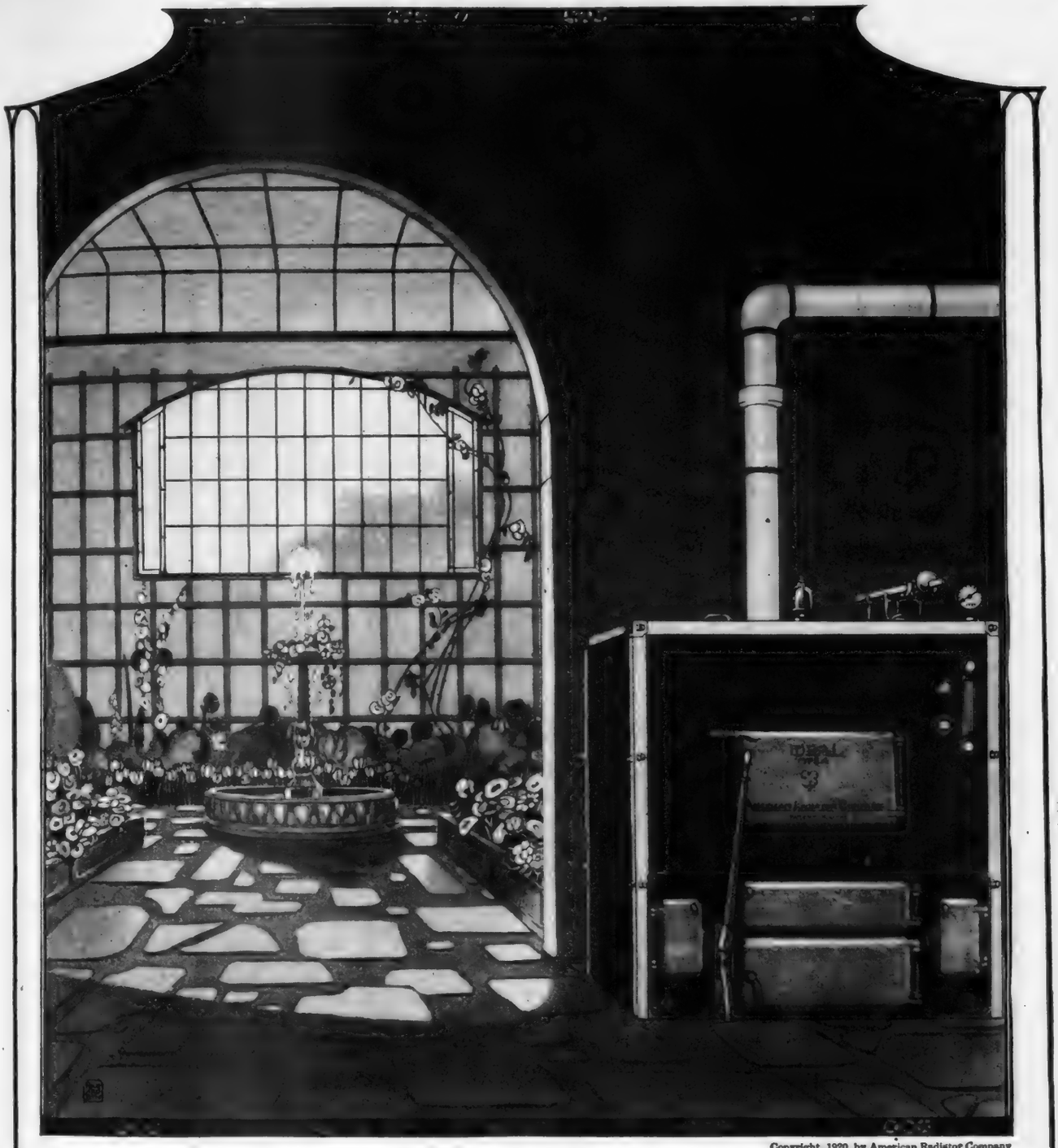
The Effect of Air in Steam on the Coefficient of Heat Transmission, C. S. Robinson. Jl. Indus. & Eng. Chem., vol. 12, no. 7, July 1920, pp. 644-646, 2 figs. Results of experiments at Massachusetts Institute of Technology. Empirical expression is formulated from results obtained. 50c.

FLOW IN PIPES.

Charts for Graphical Determination of Pipe Sizes and Velocity of Flow of Steam, H. M. Brayton. Power, vol. 51, no. 19, May 11, 1920, pp. 762-763, 2 figs. Charts constructed from formula for quantity of steam which passes a given section of pipe in terms of diameter of pipe, and velocity of steam in pipe. 20c.

Plant Engineering & Equipment Co., New York, has appointed to its sales force, W. S. Ransom, formerly with the Beach-Russ Co., New York. Mr. Ransom's long experience in the steam trade is at the service of those in need of the company's extensive line, which includes air line and return line vacuum pumps, condensation pumps with receivers, steam or electric; centrifugal pumps; bilge pumps and sewage ejectors; steam pumps of all types; and air compressors and pressure blowers. In addition the company handles an extensive line of specialties, including Trane radiator and return traps.

A. Beaurrienne, heating and ventilating engineer, Paris, France, who will be remembered by many friends in the United States through his visit to this country several years ago, is again in civil life, after having passed through some remarkable war experiences, and has formed a new company under his own name at 225, Rue des Marguettes, Avenue de St. Mande, Paris.



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gives this unique opportunity, for the Type "A" is handsomely finished, dust-free, gas-tight, smoke-tight, and is automatically controlled for steam or water heating. Specify and use the IDEAL TYPE "A" BOILER—it guarantees 30% fuel saving.

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THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

STEAM LAUNDRY EQUIPMENT.

General.

Steam laundry equipment is, to a great extent, special in design, and is built by manufacturers from their own patents and experience. In general features, however, steam laundries possess a considerable similarity of equipment to perform the necessary operations in order to properly wash, dry and iron the various articles of clothing which they are required to handle. All steam laundries employ steam to a considerable extent in their operations, hence the name—steam laundries—although this title does not necessarily mean that the power is supplied through a steam engine. In fact, a great many of the more modern laundries use motor-driven machines entirely.

The most important requisite in the design of a laundry is the obtaining of the number of pounds of steam required per hour for the operation of the equipment, the steam requirements usually consisting of the following: for running steam engine (if an engine is used), for drying (if a dry room is installed), for heating the mangles, for heating water and sometimes for warming various parts of the building, as well as for smaller connections to other apparatus.

If a building possesses a high-pressure boiler plant, no separate steam boiler is required for the laundry, but, on the other hand, if a building has only a low-pressure heating system, or for any other reason has no high-pressure steam, then a special steam boiler for laundry uses must be employed. In laundries where a steam engine is used to furnish power, it has generally been found that a steam drive is much more economical than an electric drive, owing to the fact that the exhaust from the engine may be utilized in the coils in the dryer, to heat the water, and also to provide steam for any radiation that may be desired. On the other hand, the space occupied by the engine, together with the belt, shafting, etc., may render the arrangement of the laundry less convenient than where individual motor drive is used.

Engine—If an engine is to be installed a moderate-priced slide-valve type is usually selected, this class of engine commonly requiring about 40 lbs. of steam per horsepower per hour, and, on an average, it is safe to figure that 85% of this steam is available in the exhaust for any low-pressure heating service which may be desired. Thus it can be seen that the installation of the engine would require an additional boiler horsepower of only some 15% of the engine steam consumption over what ordinarily would be required for heating if the engine were omitted. Thus for a 30 h. p. engine the increase in boiler horsepower would be 30 h. p $\times$ 40 lbs. $\times$ 15% $\div$ 30 or about 6 boiler horsepower.

Where the exhaust from the engine is used to supply steam in the dryer and water heater, an oil separator should be placed in the line and the condensation should be returned to the boiler through a lift and direct-return trap or by means of an automatic return pump. If the calculations show that the engine exhaust is not sufficient to supply the dryer, hot water tank and any heating radiation which may be required, a pressure-reducing valve should be installed as a make-up from the high-pressure line.

Dryer Room—The steam required for drying is admitted to pipe coils located in the drying room or dryer and the number of square feet of the pipe in the coils times an efficiency of 350 B. T. U. per square foot will give the approximate B. T. U. supplied to the dryer, which amount divided by 250 will give the equivalent direct radiation (E. D. R.).

Mangle—The amount of steam required for the mangle is best obtained from the manufacturer, although a safe approximation is given in Table 4 on Standard Data Sheet No. 172-C. In order to perform the work satisfactorily it has been found that a steam pressure of approximately 60 lbs. gauge is required to give the proper degree of heat to the rolls.

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

STEAM LAUNDRIES.

Hot Water Supply.

The quantity of hot water required per hour is usually based on 1 gal. per hour for each piece daily capacity of laundry. Thus, a laundry designed to handle, say, 1,000 pieces per day should have a hot water supply of 1,000 gal. per hour. This quantity should be reduced to pounds by multiplying by 8⅓. The total B. T. U. per hour required will be the number of pounds of water times the temperature rise (which rise is usually assumed as 50° to 210° F., or 160° F.). The total number of B. T. U. divided by 250 will give the equivalent direct radiation. The tank capacity should be about 25% in excess of the demand to prevent excesive cooling of the water, by drawing off too great a proportion of the contents.

Multi-Coil Steam Heaters—The coil surface required to heat the amount of water necessary may be computed by finding the average temperature of the water passing through the heater $\frac{(210 - 50)}{2}$ or 130° for the temperatures which we have assumed, and the temperature difference between the average water temperature (130°) and the steam (220°) or 90°. With this temperature difference each square foot of coil surface will condense about 14 lbs. of steam per hour and the total coil surface will be the total amount of steam it is desirable to condense divided by 14; another safe ratio is to install a copper coil with 6 to 7 sq. ft. area for every 100 gal. to be heated per hour.

It is very desirable to have the hot water tank made of copper as iron tanks are liable to rust and discolor the clothes, while the heating coils should be of brass pipe and brass fittings; one head of the tank should be flanged and bolted so as to permit inspection and repairs.

Automatic temperature regulation should also be provided. These heaters are of stock design, and can be purchased from regular manufacturers, being known as the multi-tube or multi-coil heaters.

A few general dimensions for such heaters are given in Table 1.

TABLE 1. WATER STORAGE HEATERS.

Storage Capacity Gallons.	Heating Capacity Gals. Per Hr.	Diam. In.	Overall Length Inches.	Coil Surface Sq. Ft.
25	100	12	52	6½
50	200	15	66	13
75	300	18	76	19½
100	400	20	78	26
125	500	22	78	33
150	600	24	78	40
190	750	24	102	49
250	1000	30	84	67
375	1500	30	126	100
425	1750	36	102	117
500	2000	36	126	133
640	2500	36	150	167
700	3000	42	126	200
860	4000	42	150	286
1150	5000	42	198	333
1500	7500	48	198	500

Coal Heaters—In laundries where electric power is used for driving purposes, hot water is often heated by a cast-iron sectional heater, the size being based upon the burning of 5 lbs. of coal per hour per square foot of grate surface, and an efficiency of 8,000 B. T. U. per hour of coal burned. As it takes approximately 1,300 B. T. U. to heat one gallon of water from 50° to 210°, 1 sq. ft. of grate must be provided for approximately every 30 gal. of water per hour desired to be heated.

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

STEAM LAUNDRIES.

Boilers.

A large part of the heating in the laundry will be done by the radiation from the apparatus, dry room, etc., but it is usually also necessary to supply heat to supplement this to prevent the frezing of the pipes when the apparatus is not in operation and for adjoining rooms, offices, etc. Usually 250 B. T. U. per square foot for cast-iron radiators and 300 B. T. U. for pipe coils surface may be used for all such heating. The total B. T. U. divided by 250 gives the equivalent direct radiation to which 25% should be added for piping.

Boilers—The boilers generally used for laundry work are either of the vertical or horizontal return tubular type. The small vertical boilers are usually obtainabe in the sizes and horsepowers as shown in Table 2. While H. R. T. boilers are obtainable in almost any horsepower, a few of the standard sizes from 18 to 50 h. p. are given in Table 3; boilers should be of the high-pressure type designed for 100 lbs. workingpressure.

TABLE 2—VERTICAL BOILERS.

Diam of Shell In.	No. 2-in. Tubes.	Length Tubes.	H. P.
30	45	3 ft. 0 in.	5.8
30	45	3 ft. 6 in.	6.5
30	45	4 ft. 0 in.	7.3
30	45	4 ft. 6 in.	8.0
30	45	5 ft. 0 in.	8.7
36	65	4 ft. 0 in.	10.3
36	65	4 ft. 6 in.	11.4
36	65	5 ft. 0 in.	12.5
36	65	5 ft. 6 in.	13.5
36	65	6 ft. 0 in.	14.6
42	100	4 ft. 6 in.	17.0
42	100	5 ft. 0 in.	18.7
42	100	5 ft. 0 in.	18.7
42	100	5 ft. 6 in.	20.3
42	100	6 ft. 0 in.	22.0

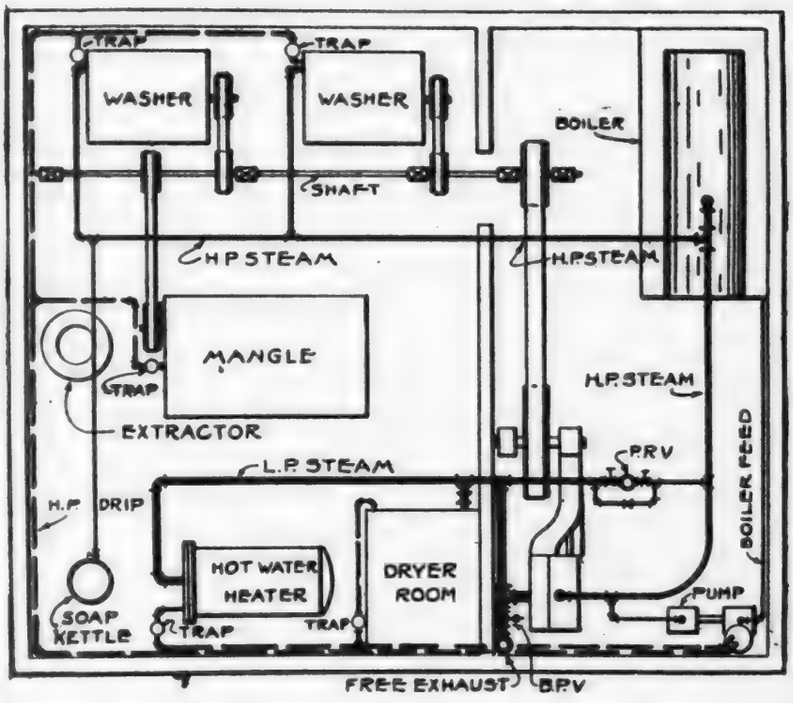
TABLE 3—HORIZONTAL BOILERS.

Diamof Shell In.	No. 3-in. Tubes.	Lenghth Tubes.	H. P.
42	34	9 ft. 0 in.	18
42	34	10 ft. 0 in.	20
42	34	11 ft. 0 in.	22
42	34	12 ft. 0 in.	24
42	34	13 ft. 0 in.	26
42	34	14 ft. 0 in.	28
48	44	10 ft. 0 in.	30
48	44	11 ft. 0 in.	33
48	44	12 ft. 0 in.	36
48	44	13 ft. 0 in.	39
48	44	14 ft. 0 in.	42
48	44	15 ft. 0 in.	45
48	44	16 ft. 0 in.	48
54	54	11 ft. 0 in.	35
54	54	12 ft. 0 in.	38
54	54	16 ft. 0 in.	50
54	54	13 ft. 0 in.	41
54	54	14 ft. 0 in.	44
54	54	15 ft. 0 in.	47

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

STEAM LAUNDRIES.

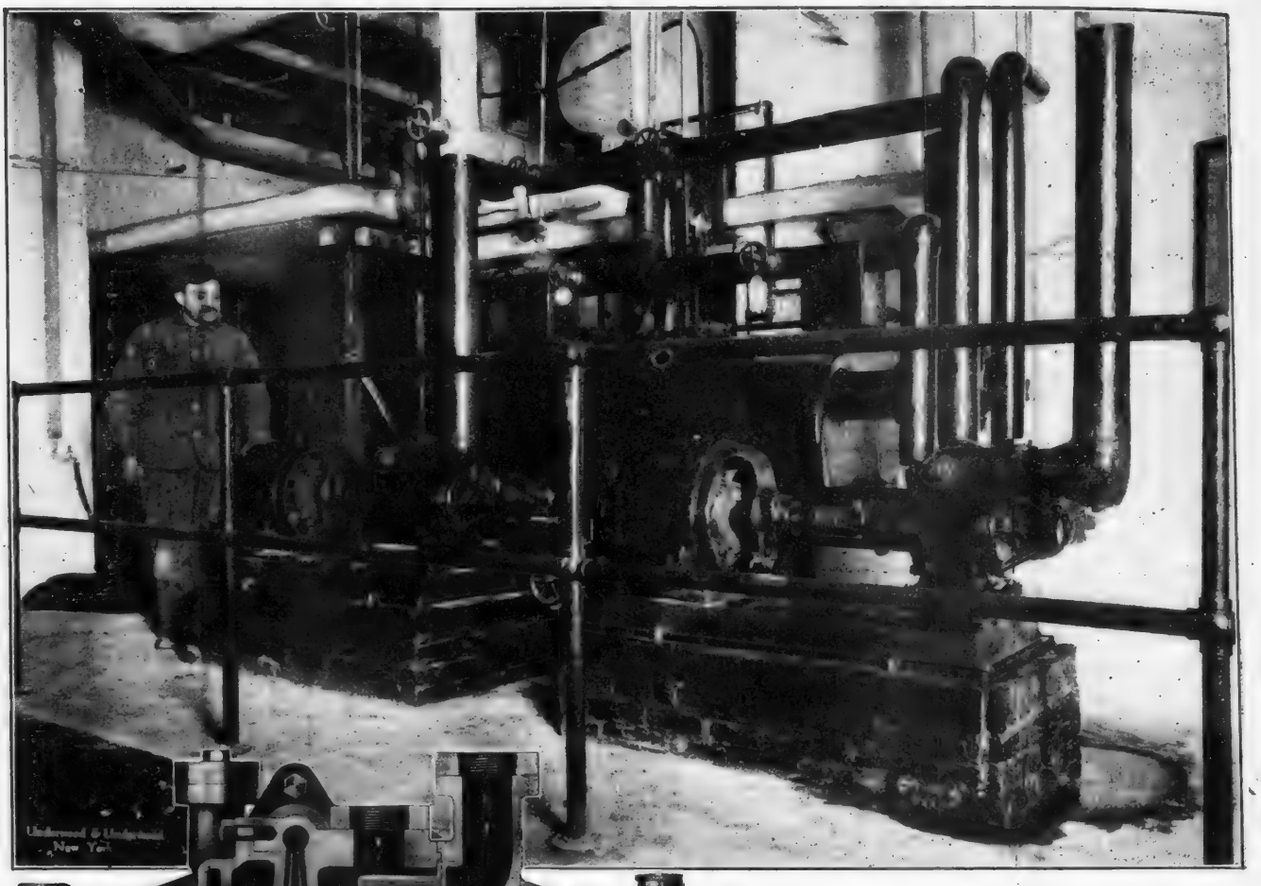
Typical Arrangement.

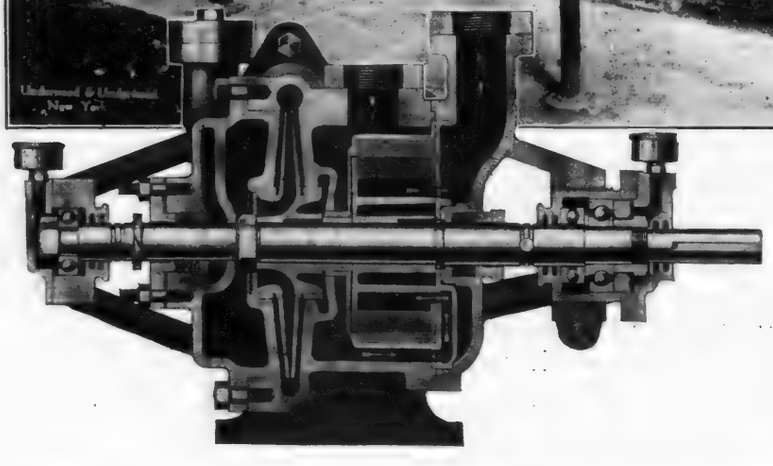


A typical layout of a small steam laundry is shown in Fig. 1 in which the steam is generated in a high-pressure boiler and supplied to the engine and mangles at the boiler pressure. The low-pressure line is fed by the engine exhaust through an oil separator and is cross-connected to the high-pressure line with a pressure-reducing valve and by-pass. This exhaust line is also connected to the atmosphere through an atmospheric exhaust and back-pressure valve. The high-pressure returns are trapped and discharged back to the feed pump, and the low-pressure returns are separately trapped and also discharged to the same feed-pump upon which is mounted a vented receiver.

STEAM LAUNDRIES—Typical Arrangement. | No. 172-C

EFFICIENT HEATING *demands the* JENNINGS PUMP





Duplex D Unit, Automatic Operation

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Combined capacity 80,000 sq. ft. direct radiation. Each pump has an air capacity of twenty-five cubic feet per minute in addition to a water capacity of sixty gallons per minute.

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THE Jennings Pump consists of two independent turbine units, an air pump and a water pump. As each material is handled separately, the boiler pressure is against the water only. The air and vapor, approximately four-fifths of the volume handled, are delivered to atmosphere without back pressure. The saving in horse power is over fifty per cent.

Because of its compact design, this equipment can be installed in less than one-third the space necessary with other apparatus. All interior parts are bronze, supported on annular ball bearings mounted outside of casing. Moving parts revolve without contact.

There are many other reasons why the Jennings is being installed on practically all of the big jobs. Bulletin No. 8 gives them in detail. Write for it.

NASH ENGINEERING COMPANY

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TRADE AND MISCELLANEOUS NOTES

Miscellaneous Notes.

Congress of the Building Industry was held in Chicago September 27 under the auspices of the American Institute of Architects, with the object of "providing ways and means of conducting a study to the end that the various factors which have retarded necessary building and construction may be eliminated and that a thorough study be made of the relations of the various elements and industries which enter into building and construction activities." It is further proposed that "a building and construction congress be permanently established to give continuity to the nationally beneficial objects which gave it birth." The congress was a direct outcome of the report of the institute's Post-War Committee on Architectural Practice which dwelt at considerable length on different phases of building industry in the United States and recommended that the Parliament of the Building Industry in England be studied with a view to the possible formation of a central affiliation of the building interests in the United States.

Housing in New York State is discussed by a writer in the *Journal* of the American Institute of Architects, who states that while the legislature of New York may take some action in the housing matter, from present appearances that action will be based, not upon the housing needs of the people, but upon the financial needs of those who control the agencies upon which the building of houses is at present dependent. It is pointed out that the suggestions of the tenement house commissioner in connection with municipal housing projects does not include any provision for heat on the ground that heating equipment is now too expensive to be included in what is commonly called "housing" work.

New York City's public school budget for 1921, which has been adopted by the Board of Education, amounts to $143,549,019.88. For the acquisition of sites and construction of buildings $46,920,327.60 is asked. Among the elementary schools to be constructed are the following: New building at Mermaid Avenue and West 32nd Street, Brooklyn, 2000 sittings, to cost $1,405,947; a building at Franklin Avenue and 169th Street, Bronx, 2000 sittings; a building at Grant Avenue and 170th Street, Bronx, 2000 sittings; a building at Crown Street and New York Avenue, Brooklyn, 2000 sittings. The total amount needed for elementary schools is $35,662.933 and for sites, $2,025,000. For high schools $11,500,000 is required, and $525,000 for sites. A new training school for trades is planned, to seat 2500, and to cost $2,500,000. A new building for the deaf in Manhattan will cost $800,000 and the site, $197,000.

Building Code for Pennsylvania has been re-drafted by the State Department of Labor and Industry through the State Building Code Commission. It was presented to the last legislature but was not adopted. The department is sending a letter to the architects and builders of Pennsylvania pointing out that there is now more need than ever

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for more adequate building regulations and asking for their co-operation in securing the adoption of the proposed code. A meeting with this object in view has been set for October 15 in Harrisburg. The bill as presented had incorporated within it a provision to the effect that separate codes for the several classes of buildings be worked out as standards of the Industrial Board of the Department of Labor and Industry.

Chamber of Commerce of the United States, in a bulletin dated September 25, prepared by the chairman of the Committee on Statistics and Standards, reports that good business is indicated for the remainder of the year. While conservation and caution seem to be the keynote of business everywhere, states the report, there is no evidence of apprehension, except in a few unimportant quarters. The peak of high prices and business activity, it is added, is passed. With regard to the building industry the report states that it has practically come to a standstill throughout the country because of being tied hand and foot by high prices and the unreliability and uncertainty of labor, high prices and scarcity of material, and the almost impossibility of financing any construction. "The Sister Anne of Hope," concludes the report, "is sitting upon the housetop of expectancy, scanning the distant horizon for that little cloud of dust which shall announce the stability of labor, the lowered cost of construction, the possibility of getting building material, and the loosening of credit, that are needed for the resumption of activity in this great and important industry."

Board of Estimate of New York City has appealed to Governor Smith for legislation at the special session of the legislature that will make it possible to issue bonds to raise as much of the $46,000,000 requested by the Board of Education for its school building programme as the Board of Estimate decides shall be granted. If legislation is not secured the Board of Estimate will be limited in issuing bonds for

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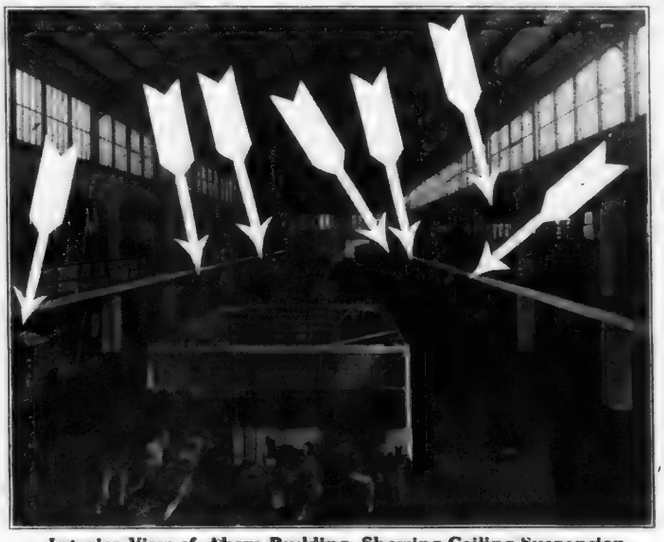
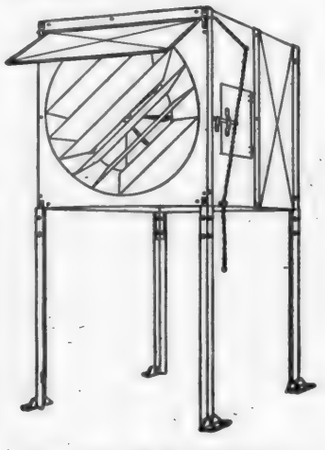
Exterior View of Monitor Type Building Occupied by Service Station Equipment Co., Chicago, Ill., Equipped with Ilgair Unit Heaters



Interior View of Above Building, Showing Ceiling Suspension Type of Ilgair Unit Heaters



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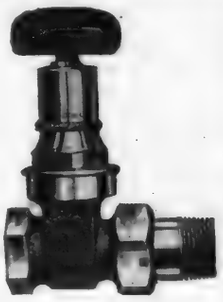

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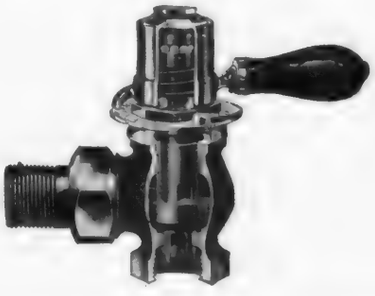
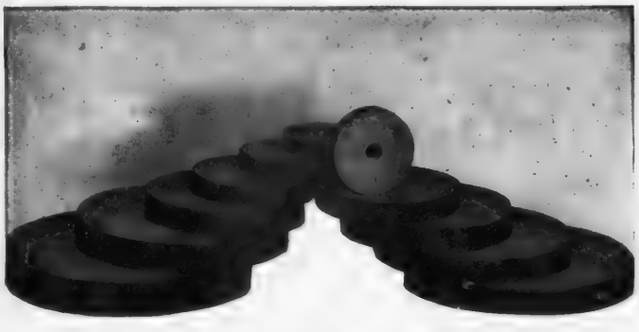


Write for Catalogue and Discounts

The Dole Valve Company

208 North Wells St. CHICAGO



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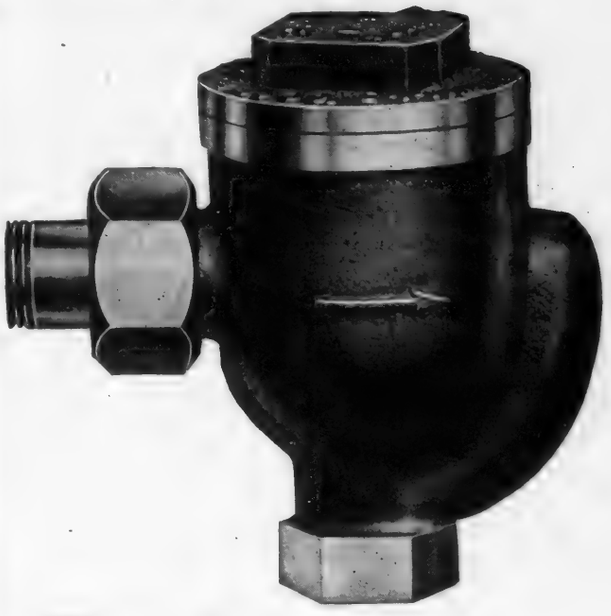

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school purposes and also for all other non-revenue producing improvements, to $15,000,000 under emergency amendments to the "pay-as-you-go" law that remains in force for the period of the war and for one year thereafter. Additional funds would have to be put in the tax budget.

Committee of Representatives of the Construction Industry in Greater New York has been organized for the purpose of acting directly with the Association of Railway Executives in securing the prompt movement of construction material essential to the public interest. In the announcement of this committee, which is sent out by the Senate Committee on Reconstruction and Production, it is stated that the work of the newly-appointed committee will go far towards relieving the acute housing shortage in Greater New York. The chairman of the committee is Dr. J. T. Duryea, president of Pierce, Butler & Pierce Manufacturing Corporation and its headquarters are at 29 West 39th Street, New York. The committee is prepared to receive applications for assistance in expediting the movement of construction materials from point of origin to destination in cases where the ordinary routine methods have failed and where the public interest is at stake. The fact that the organization of the new committee was suggested by Daniel H. Willard, chairman of the Advisory Council of the Association of Railway Executives, is taken as indicating the determination on the part of the carriers to use the present facilities of the railroads as far as possible to relieve cases where the emergency is greatest.

Smoke Prevention Association held its fourteenth annual convention in Chicago, October 5-9.

Associated General Contractors of America has moved its headquarters from Chicago to Washington. Its new address is 1038 Munsey Building, Washington, D. C.

New York State Industrial Commission has adopted "Rules as Amended Relating to the Construction, Installation, Inspection and Maintenance of Steam Boilers." The new code became effective July 1, 1920. While heating boilers, which are defined as those which carry a pressure of 15 lbs. or less to the square inch, are not under the jurisdiction of the Industrial Commission, it is recommended that the rules of the A. S. M. E. Boiler Code, 1918 edition, be observed, these rules being given in full. It is pointed out that the rules do not apply to economizers or feedwater heaters. The code is published by the Bureau of Industrial Code, 124 East 28th Street, New York.

E. A. Hitchcock, formerly vice-president of the Bailey Meter Co., Cleveland, O., has returned to the Ohio State University where he has been appointed dean of the Engineering College.

F. W. Dean, formerly mill engineer and architect, of Boston, and for nearly three years connected with the United States Shipping Board Emergency Fleet Corporation, in charge of the steamship boiler department and testing of boilers, has resigned to become associated with L. N. Wheelock and J. C. Bogue, now of the firm of the Wheelock-Bogue Co., 141 Milk Street. The firm name has been changed to Wheelock, Dean & Bogue, Inc. and will act as New England agent for the Erie City Iron Works, Erie, Pa., and several other companies.

Dwight P. Robinson & Co. Inc., New York, (with which Westinghouse, Church, Kerr & Co., Inc. has recently consolidated) has established a new branch office in Youngstown, O., in the Home Savings & Loan Building, in charge of C. I. Crippen. The company recently moved its Cleveland office to the Citizens Building, and H. P. Clawson, who was for several years a member of the Chicago staff, was transferred to Cleveland to take charge of this office. The company now maintains branch offices in Pittsburgh, Youngstown, Cleveland, Chicago, Dallas and Los Angeles, and Sao Paulo, Brazil.

Middletown, O.—An innovation in making provision for the safety of workmen engaged in building and construction work has been introduced in the erection of large extensions to the plant of the American Rolling Mill Company, in Middleton. At 2 P. M. each Tuesday a committee composed of foremen, mechanics and laborers inspects the entire job from sewers to roof with the one purpose of seeing that proper methods are taken to safeguard the employees against accident. This

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committee makes a detailed report of each inspection to a representative safety committee which considers and puts into effect the recommendations of the inspection committee. The plan was introduced and is being carried out by Dwight P. Robinson & Co., Inc., which has been making investigations of various plans for protecting its employees. Experts in all types of building construction are agreed that the first marked reduction in building cost will come through increased production. The best features of this new safety plan are being copied by many large construction companies. The public is interested in the plan because indirectly it will lower rentals by reducing construction costs. This applies equally to industrial construction, large building projects and homes.

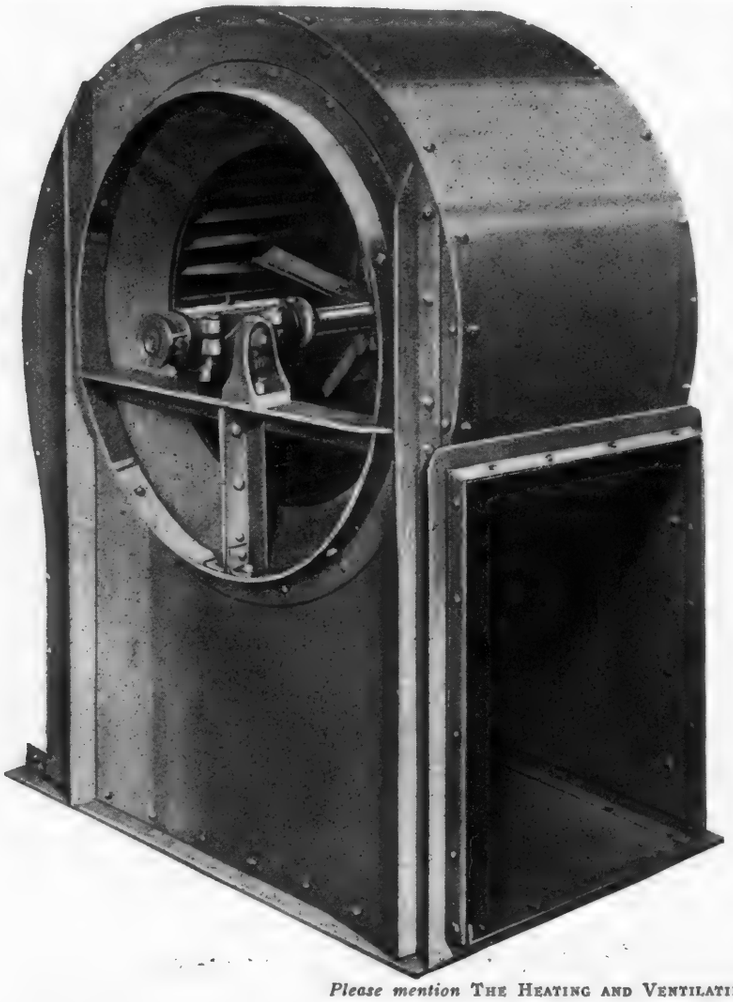
August Building Operations showed a slight increase over July, according to statistics compiled by the F. W. Dodge Company. Contracts awarded during August in the 25 States comprising the northeastern quarter of the country amounted to $205,651,000, as against $204,398,000 for July. While this increase, it is stated, is not sufficient in itself to indicate an upward trend in construction activity, there are other factors which encourage the belief that the temporary slump is nearly over. The amount of contemplated work reported in August was $357,510,000, compared with $334,341,000 for July. This increase, in view of the enormous pressing demand for buildings of various classes, gives some indication of reawakened interest in carrying out the year's building program. Contracts awarded in the first eight months of 1920, amounting to $1,952,528,000 compare most favorably with the amount for the same period in 1919, which was $1,596,314,000. The indications for the remainder of the year, it is stated, are that the succeeding months will show greater activity than has been in evidence during the summer months. Considering the various sections in detail, New England showed a decline of 23% from the July figure. New York State and northern New Jersey had an increase of 5% over July. Philadelphia, Baltimore and Washington declined 7% from the July figure. The Pittsburgh district was practically the same as July. The central West reported an increase of 12%, while the Northwest made the poorest showing, with a decline of 40% from July.

Cleveland, O.—The settlement of the strike of journeymen plumbers in Cleveland, followed by the return to work of both plumbers and steam fitters, has enabled the heating and plumbing trades in that city to resume operations. In the final settlement of the strike, which lasted three months, the journeymen were given a wage of $11.00 per day, each journeyman to furnish his own tools. The steam fitters resumed work at the present wage scale, with the understanding that a settlement would be made later at a mutual conference.

American Library Association is calling renewed attention to its "enlarged program," which is being carried out with the significant slogan, "Books for Everybody." The association cites numerous cases where manufacturers and heads of business institutions have installed in their plants special libraries of technical books for the use of their workers, as well as for reference by themselves. However, states the association, there is still a deplorable lack of good libraries in business houses, shops, mills and manufacturies when the country is considered as a whole and employers are urged to consider the benefits to be derived from these special libraries.

Central Station Heating Notes.

Toledo, O.—According to the construction placed on a letter from President Coates, which has been sent to the users of the water heating service, the Toledo Railways & Light Company may abandon the Yaryan heating service at the end of the present season, if it is found that the system cannot be



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Detroit **Michigan**

operated profitably on the recently-increased schedule of rates. President Coates said that at the hearing before the public utilities commission the company agreed to accept the rates of the new schedule, although the company engineer's analysis showed that the revenue produced thereby will not be sufficient to meet the operating expenses for the coming season and give a fair return on the investment. Operating expenses, it is stated, were not met by about $30,000 last year, although the company was then operating on increased rates. The customers have been told that while service will be furnished this season, after several months' operation the whole situation will be studied to determine the question of the advisability of abandonment. There are about 850 users of Yaryan service. There are three heating plants on the system, one on Detroit Avenue, back of Swayne Field; one on Floyd Street near Collingwood Street; and one on Twenty-second Street, near Ashland.

Wilkes-Barre, Pa.—The work of installing the steam heat line on South Franklin Street, between Ross and Northampton Streets, is practically completed.

Sioux City, Ia.—The Burlington Steam Supply Co., a branch of the People's Gas and Electric Co., which has been furnishing central station heat to offices, stores and homes in Burlington, has given notice to its consumers that they must provide their own heating facilities, as the plant has been closed. Unprofitable operation is given as the cause of the shut-down. Several groups of business houses are planning to pool their interests, as far as heating the coming winter is concerned. One plan proposed is to make an arrangement with the Harding Dry Cleaning Company to run a line from its heating plant to the city hall.

Wauwatosa, Wis.—A central heating plant for all county buildings in Wauwatosa was proposed at a recent joint meeting of the county board and the board of administration. It was estimated that the cost of such a plant would be about $300,000. The Board of administration was directed to get estimates for the work.

La Crosse, Wis.—City heat consumers have united to oppose the petition of the Wisconsin-Minnesota Light & Power Company for an increase in heating rates, amounting to 100%. The customers are now paying 19 cents per square foot for radiation.

Belvidere, Ill.—The new plant of the Belvidere Heating Company is approaching completion and it is expected, will be ready in ample time for the winter's season.

Springfield, Ill.—Higher rates for steam and water heating service than those now in effect are asked by the Springfield Gas & Electric Company, in a petition filed with the State public utilities commission. The commission is asked to continue the order of October 7, 1919, granting the company increased rates for this service. The present order terminated September 1, 1920. The company states that since the order of October 7, 1919; the cost of operating the plant has increased and that it will be necessary to ask for a still further increase in rates.

Spokane, Wash.—Steam heat for Spokane buildings from the plant of the Central Heating Company will be increased in price from 5% to 15%. In a statement regarding the situation by W. E. Coman, manager of the Washington Water Power Company, which owns the Central Heating Company, he said that because of the freight rate increase the company was forced to increase its steam heating rates. The freight increase, he stated, will mean about 20% added to the company's fuel bill. The previous price of heat ranged from 72 cents to $1.44 per 1000 lbs. of condensation, the $1.44 being the rate for the first 25,000 lbs. The company has recently installed new equipment for underfeed stokers, costing $90,000, which will permit the burning of any kind of coal.

Tacoma, Wash.—The Consumers' Central Heating Company has purchased 90 ft. on Dock Street, at the foot of 13th Street, from the Northern Pacific Railroad Company on which it is building its new heating plant. The company is taking over half of the property held by the F. T. Crowe Company in a lease from the Northern Pacific. The plan of the company, as announced in last

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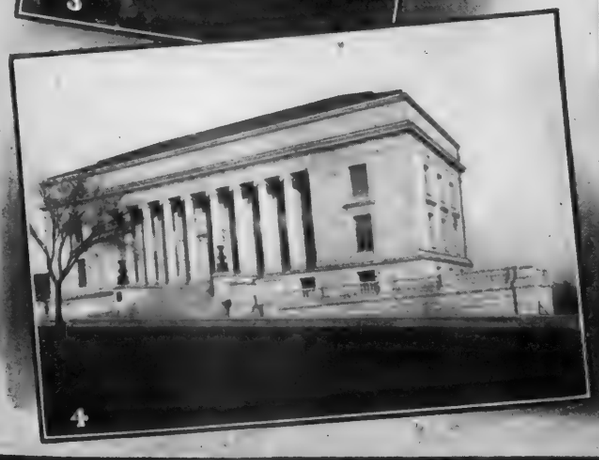

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2. Public Library, St. Paul, Electus D. Litchfield, Architect.
3. St. Paul Cathedral, E. L. Masqueray, Architect.
4. Minnesota State Historical Bldg., St. Paul, Clarence H. Johnson, Architect.

Buffalo

month's issue, to use three vacant lots on Dock Street owned by the city for the location of its plant, was found to be impracticable, owing to an ordinance which provides that the city can only lease property for a maximum term of five years. The new plant, with its equipment, will cost about $210,000 and will be one of the most modern central heating plants in the State. The building itself will be of concrete, two stories high. Three batteries of boilers will be purchased with a capacity of developing from 3,000 to 3,500 horsepower and the plans for the new building provide for the addition of more batteries from time to time. When completed the heating plant will furnish constant service of 24 hours daily. At the present time the company is only able to give service of 18 hours daily.

Efficiency in the handling of fuel will be a feature of the new plant. Owing to the scarcity of fuel oil, which may be entirely off the market for heating purposes after October 1, the company is planning to use logged fuel from the mills of the St. Paul & Tacoma Lumber Company and the Defiance Lumber Company.

The fuel will be hauled to the heating plant in special barges furnished with conveyors which will provide for the transfer of fuel from the water edge to the boilers by machinery. Space is being arranged so that an extra supply can be stored and the continuity of service guaranteed. In case of a shortage of fuel from the mills the plant will be able to ship fuel direct by automobile trucks and rail.

The plant has already arranged to supply heat for the three new buildings which are being erected on Pacific avenue. The Rust building, the Scandinavian American Bank building and the National Bank of Tacoma building will pany has been forced to build a larger and with this huge contract the company has been forced to build a larger plant to handle the new business.

To give the city an adequate central heating system the company was organized last October. H. A. Flood, formerly of Spokane, was placed in charge of the plant, and W. R. Rust was elected president of the concern.

The officers of the company are: W. R. Rust, president; J. S. Baker, vice president; H. A. Flood, vice president and general manager; H. V. Alward, treasurer; H. S. Griggs, secretary. The directors include Charles Drury, Henry A. Rhodes, William Jones, Everett G. Griggs, and W. H. Snell.

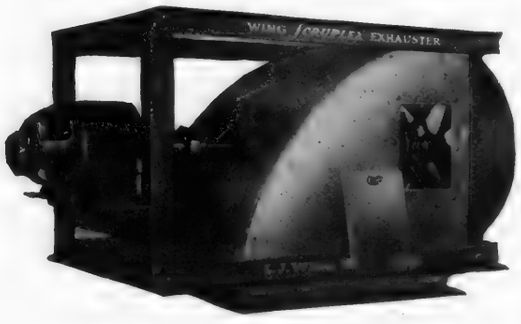
Manufacturers' Notes.

Sarco Co., New York, was among the exhibitors at the Sixth National Exhibition of Chemical Industries, at the Grand Central Palace, New York, September 20-24, with a display including steam traps, temperature regulators, recording gas calorimeters and CO_2 recorders. The steam traps were shown with the special Sarco tubular diaphragms and liquid expansion, the claim being made that they were the only low-price high-pressure type on the market. The temperature regulators shown are especially designed for industrial purposes to regulate temperatures within a range of from 30° to 300° F. and were featured as being particularly suitable for chemical manufacturing operations, hot water service tanks, oil heaters, etc. The Sarco recording gas calorimeter, it was explained, is of the type adopted by the Public Service Commission of New York. It burns gas in a finely-regulated flame, the varying heat of which is recorded continuously on a chart, giving a record in thermal units of the heat value of the gas. The company's representatives in charge of the exhibit were E. J. Ritchie and G. W. Bergen.

Pittsburgh Gage & Supply Co., Pittsburgh, Pa., announces the appointment of W. Woodward Williams as assistant to the president. Mr. Williams resigned as vice-president of the Reading Iron Company to accept his new duties. He was general manager of the Reading Iron Company in charge of sales and was previously general sales manager of the A. M. Byers Company.

John Trageser Steam Copper Works, New York, has purchased a three-story building adjoining its plant at 440-442 West 27th Street, to provide additional space for the company's increased business.

THE COLD WEATHER INCREASES THE DEMAND



WHEN THE COLD WEATHER ARRIVES windows are kept down, and there is no way for the steam, smoke, fumes and polluted air to escape. This is not only harmful for the workers, but prevents them from doing a full day's work, and under present labor conditions makes it difficult to get sufficient help. The

WING-SCRUPLEX EXHAUSTER
REG. U.S. PAT. OFF.

prevents this by removing the cause at the source. With it the windows can be kept closed to assure a comfortable temperature, and at the same time it will remove the polluted air and replace it with a continuous supply of pure, fresh air.

There is an opportunity for installing a WING SCRUPLEX FAN or EXHAUSTER in every mill, factory, foundry, shop, hotel, restaurant, steam and boiler room, office—everywhere.

The WING SCRUPLEX is the only Exhauster with the motor entirely outside of the air duct, where it will keep clean and free from injurious action of the polluted air. This insures long life and minimum attention.

Our Engineering Department will be glad to advise with you concerning any ventilating problems you may have on hand or in view. This service is yours without cost.

Bulletin 58-A explains how the WING SCRUPLEX EXHAUSTER is doing the work in many plants throughout the country.

Send for your copy today.

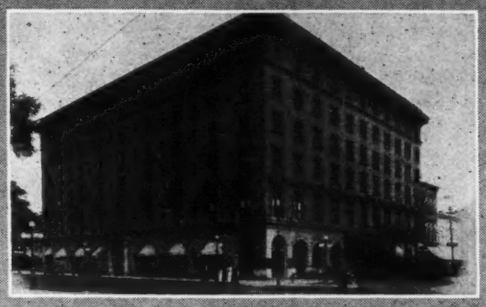
L. J. Wing Mfg. Co.

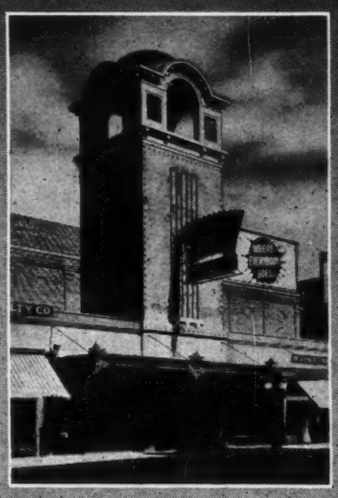
Fans and Blowers (all types) **Damper Regulators**

Hudson and 13th Streets **New York City**

In this Hat Factory the WING-SCRUPLEX EXHAUSTER is removing vapor from steam spouts. A WING-SCRUPLEX FAN is providing general ventilation.

Sturtevant
PUTS AIR TO WORK





Amicable Life Building, Waco, Texas
SANGUINET AND STAATS, ARCHITECTS
J. A. OSBORNE, ENGINEER

Oliver Hotel, South Bend, Indiana

Empress Theatre, Sacramento, Calif.

WHY DOES MANUFACTURER RESEARCH DETERMINE CONTRACTOR SUCCESS?

Have you ever been disappointed with your heating and ventilating jobs because the volumes and capacities of fans failed to meet your specifications?

Engineers and contractors *do* experience such situations and usually it is because they have specified or bought apparatus minus—manufacturer research and engineering.

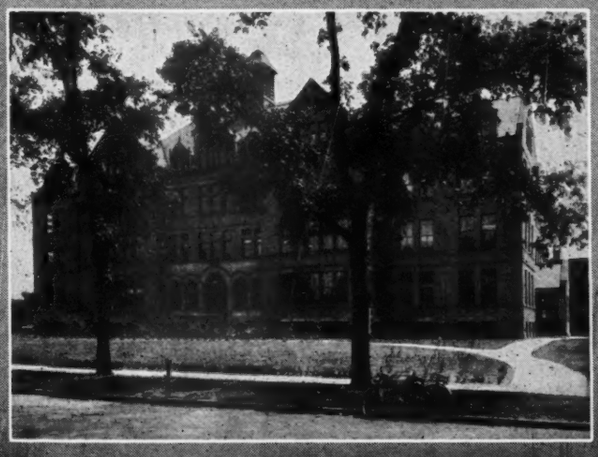
Assurance of the success of a job rests in constant research and attention to manufacturing detail. Any amount of effort exerted by the engineer or contractor cannot overcome errors made in manufacture. It is apparent, therefore, that installation success is the outcome of constant research plus well-made apparatus, the real merit of which is proven by year in and year out performance.

In all classes of buildings and under all conditions of operation Sturtevant systems prove successful. We manufacture heating and ventilating equipment suitable for dairy lunch or skyscraper with equal attention to the requirements of either.

Consult any one of our sales-engineering branches or write to Hyde Park for literature, stating the class of building you are interested in.

B. F. STURTEVANT COMPANY
HYDE PARK, BOSTON, MASSACHUSETTS
AND ALL PRINCIPAL CITIES

West High School, Cleveland, Ohio



Unitarian Church, Cleveland, Ohio
BRIGGS AND NELSON, ARCHITECTS

General Heating Corporation of America, New York, manufacturer of heating apparatus, has increased its capital stock from $150,000 to $1,000,000.

McNab & Harlin Mfg. Co., New York, has increased its capital stock from $300,000 to $1,300,000.

National Tube Co., Pitsburgh, Pa., acquired the building formerly occupied by the Pittsburgh Brewing Company, on Fourth Street, McKeesport, Pa., at a cost of $30,000. It is stated that the company is purchasing considerable ground in the vicinity of the McKeesport Works which will be used as a site of a new $500,000 building.

Walker & Pratt Mfg. Co., Boston, Mass., has let the contract for the building of its new one-story foundry to the H. Nawn Construction Co., Roxbury, Mass. The new building will be 200 x 230 ft. and will cost about $200,000, including equipment.

Borden Co., Warren, O., has just completed a two-story addition to its plant.

Massachusets Blower Co., Watertown, Mass., has opened a machine and structural department for ornamental iron work, etc., in charge of C. V. Greene, who was connected for many years with the New England Structural Co., Boston. The department employs about 100 men.

Victor Heating Co,, Marshalltown, Ia., will add three one-story buildings to its plant, increasing its floor space by 48,000 sq. ft.

New York Blower Co., Chicago, Ill., manufacturers of fan heating and ventilating apparatus, has appointed the Sheffler-Gross Company, with headquarters at 635 Drexel Building, Philadelphia, Pa., as representatives for the Philadelphia and adjacent districts.

New Firms and Business Changes.

E. Vernon Hill Co., Chicago, Ill., has been organized as "aerologists," specializing in testing heating, ventilating and air conditioning apparatus, and in the design of special equipments. The

CUT THE HIGH COST OF FUEL

USE THE

Ray Rotary Crude Oil Burners

FOR STEAM AND HOT WATER BOILERS

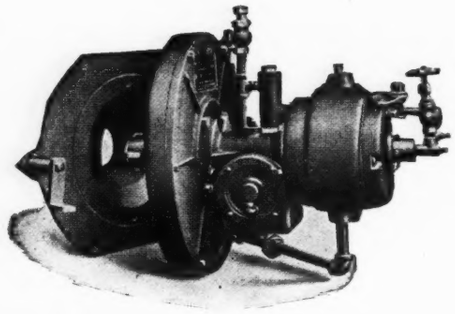
Adapted to Any Type of Boiler or Furnace

High or Low Pressure, 10 to 300 H. P.

Write for Circular H

W. S. RAY MFG. CO., 29 Spear St., San Francisco, Cal.

Manufacturers of Ray Crude Oil Burners, Ray Oil Gas, Coal or Wood Heavy Steel Ranges



Buckeye Multiblade Fans

are made especially for low pressure Heating and Ventilating work. They are giving perfect satisfaction.

CORRECT DESIGN. HEAVY CONSTRUCTION, NOISELESS OPERATION, WORKMANLIKE FINISH, HIGHEST EFFICIENCY.

Our Engineering Department is maintained for the purpose of assisting Engineers, Architects, etc., in planning efficient Heating and Ventilating Systems for all buildings.

THIS DEPARTMENT IS FREE TO YOU.

We also manufacture a complete line of Disc, Cone and Steel Plate Fans.

Write Department D

BUCKEYE BLOWER CO.

COLUMBUS OHIO.

The Fifth Avenue Building, New York
Maynicke & Franke, Architects
Equipped with Massachusetts Fans

Massachusetts Fans

NO more definite or pronounced endorsement of the proved excellence of **MASSACHUSETTS FANS** can be made than is implied in their specification for a building noted for the exceptionally high character of its equipment. The splendid building pictured is one of many hundreds of similar undertakings where **MASSACHUSETTS FANS** have been the selection of architect and engineer—**chosen on their merits**—as leaders in their field. **MASSACHUSETTS FANS** save space and weight, are unusually low in upkeep and operating cost, practically noiseless and afford the nearest approach to complete efficiency in fresh air supply and exhaust systems that human skill has yet attained.

Where may we send you ALL the facts about MASSACHUSETTS FANS?

Massachusetts Blower Co.

Watertown, Mass.

Branches in 20 principal cities throughout the country

company will also act as manufacturers and distributors of air testing instruments, psychrometric and synthetic air charts, etc. Dr. E. Vernon Hill, president of the American Society of Heating and Ventilating Engineers, is at the head of the new company, which has opened offices at 117 North Dearborn Street, Chicago.

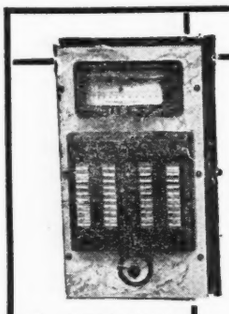
Sheffler-Gross Co., sales engineers, Philadelphia, Pa., has moved its offices to 635 Drexel Building, Philadelphia. The company handles heating and ventilating equipment and temperature control apparatus of the following manufacture: Sylphon specialties and temperature control apparatus, Fulton Co.; fans, blowers, etc., New York Blower Co.; steam and heating specialties, American District Steam Co.; and ventilating equipment, Air Conditioning & Engineering Co., St. Louis, Mo.

WANTED

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisements contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

Wanted.—By January 1, superintendent and estimator, experienced in all branches of heating and power work. Opportunity will be given to right man to acquire an interest in firm. Write fully as to age, experience, references and salary expected. Thatcher Heating Co., 46 So. Broadway, Akron, O.

Representatives Wanted.—The ventilating business is in its infancy, but growing rapidly. Now is the time to obtain one of the best accounts in this field. A well-established ventilating fan manufacturing concern has open territory in the East, South and Middle West, and desires a few live-wire representatives who are willing and able to take immediate advantage of the growing demand for this equipment. Address S. W., Station C, New York, N. Y.



No. 420 Wall Cabinet, one of several types manufactured, adapted for indicating and recording temperature.

The Cleveland Electric Thermometer affords the custodian or engineer means of instantly and accurately determining the temperature of any room or the outside atmosphere, without leaving his office.

This results in uniform heating, complying with state and municipal laws pertaining to public buildings and also saves fuel.

The Cleveland Instrument Co.
6523 Euclid Ave., Cleveland, Ohio
New York Reps.: Herman H. Stricht & Co.

PECO

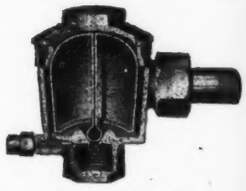
The Fool-Proof Valve

'The System with a Record"

Over thirty plants "Pecoized" for one company

20% to 40% fuel saving

Let us talk over your condition with you



Non-adjustable Positive in action

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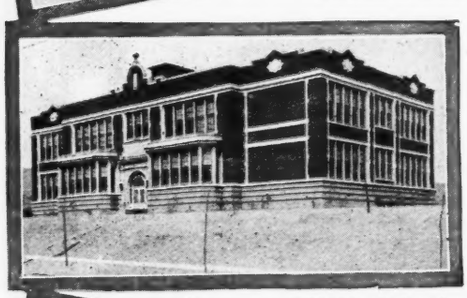
Mfrs. Peco Vacuum System of Steam Heating and Drying
JEANNETTE PENNSYLVANIA

Watson School



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These Salt Lake City Schools

are examples of modern, efficient ventilating and heating methods. They are supplied the year round with pure, fresh air at the required temperature with

Bayley Plexiform Fans

"There's a Reason"

Bayley equipment was chosen because of its sturdy construction, perfect balance, low power requirement, space economy and its ready adaptability to given building conditions and requirements.

Bayley Engineers

are ready to give you the benefit of their experience in designing and installing modern hygienic heating and ventilating equipment, of which they have made a special study. Their services are yours for the asking.

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